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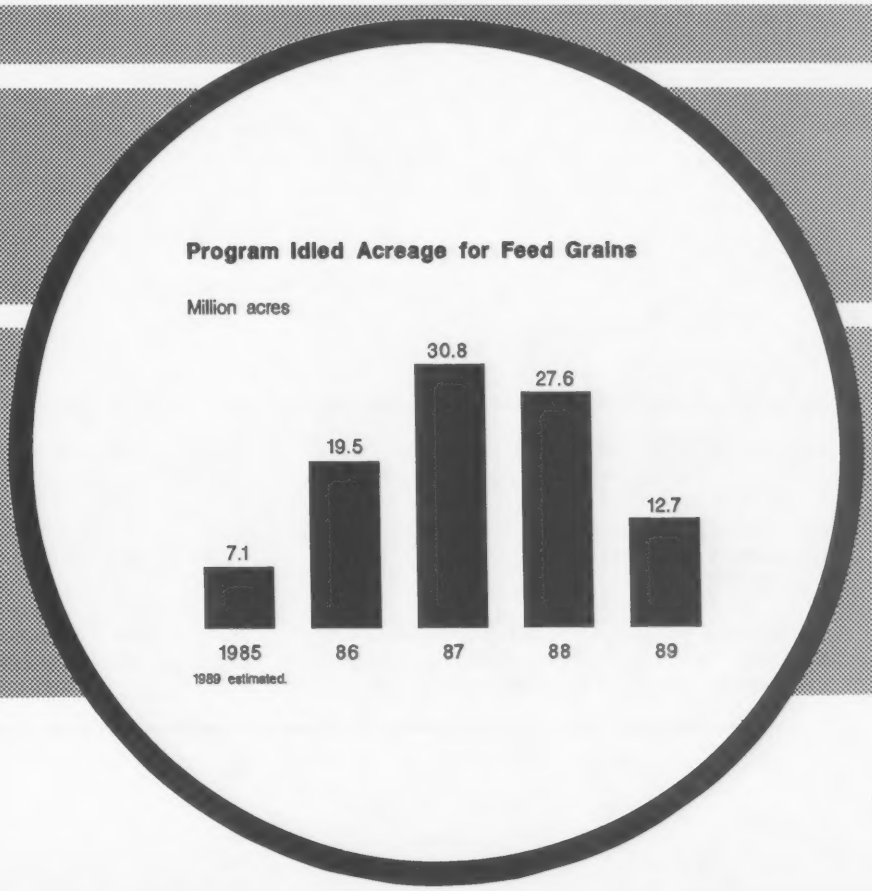
Feed

Situation and Outlook Report



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Summary

U.S. feed grain production for 1989/90 is projected to total 233 million metric tons, up more than 50 percent from last year's drought impaired harvest of 149 million tons. Farmers reported intentions to increase plantings by 6 percent this year, and area harvested for grain will rise even more because of lower abandonment. Also, yields are expected to recover from last year's drought reduced levels. Projected increases by crop are: corn, 60 percent; sorghum, 20 percent; barley, over 50 percent; and oats, almost 100 percent.

The feed grain supply for 1989/90 is projected to be 296 million tons, up 4 percent from 1988/89. Beginning stocks for 1989/90 are forecast at 61.6 million tons, less than one-half of this year's beginning stocks, and the lowest since 1985/86.

Global production of coarse grains should increase sharply in 1989/90, mainly because of a large rebound in U.S. crops. Foreign production gains are also expected, but on a smaller scale. World production is projected at 824 million tons, up 100 million from 1988/89 and the highest since 1986/87. Global consumption is projected to expand about 2 percent to a record 820 million tons, surpassing the previous high in 1987/88. The United States will account for most of the expansion, but foreign use should also increase slightly to another record. The narrow margin between world output and use projected in 1989/90 will permit only limited stock rebuilding, following 2 years of stock decreases.

Spurred by strong Soviet demand, world coarse grain trade for 1988/89 is forecast to rise 18 percent to almost 98 million tons. Trade will probably dip in 1989/90, but it is projected to stay relatively high at 95 million tons. The U.S. market share could fall from 64 to 60 percent in 1989/90, because of slightly contracted import demand and increased competition. However, Soviet coarse grain imports are expected to remain relatively large.

U.S. disappearance of corn for the 1988/89 December-February quarter totaled nearly 1.9 billion bushels, down over 12 percent from the corresponding quarter a year earlier. Exports were up 100 million bushels, but feed and residual disappearance dropped more than 360 million bushels. For the entire 1988/89 marketing year, exports are forecast to rise 20 percent to 2.1 billion bushels. However, expected feed and residual use for the year has been reduced more than 700 million bushels to 4.0 billion.

Total use of sorghum in 1988/89 may reach 835 million bushels, up 2 percent from 1987/88. Food, seed, and industrial (FSI) use is estimated to increase 10 million bushels from last year, mainly because of additional use in alcohol. However, domestic use will be pulled down by a drop in feed and residual use. The big increase in exports—30 percent above 1987/88—will offset lower domestic use.

Total sorghum supply for 1989/90 is projected to fall 11 percent from 1988/89, as a sharp drop in carryin stocks offsets a 20-percent increase in production. Total use may slip from 1988/89 levels as exports drop back, but use could exceed production for the third consecutive year, leading to another reduction in stocks.

Total barley supply in 1989/90 is projected to about equal that of 1988/89. Total use in 1989/90 may be 4 percent above this year due to the increase in feed and residual use, as increased production offsets lower carryin stocks.

Food use of oats has taken a quantum leap since the publication of several research articles linking oat bran to decreases in serum cholesterol. The milling industry has sharply expanded its use of oats in 1988/89 over the preceding year. Strong demand for human food and specialty horse rations have priced oats out of many feed rations. With a more "normal" crop expected in 1989/90, more oats will likely be fed as prices drop sharply.

During the 1988/89 hay crop year, use was 136.5 million short tons, down 11 percent from last year. Since beginning stocks were down and 1988 production was cut by the drought, stocks were drawn down 36 percent from a year earlier to achieve even this reduced level of use. In early March, farmers indicated plans to harvest 63.1 million acres of hay in 1989, down 4 percent from last year.

Sharply higher prices for feed grain have evidently caused producers to use it sparingly. Feed and residual use of corn in September 1988-February 1989 fell 18 percent from the same period last year. However, animal numbers are little changed from last year. Feed and residual use of the four feed grains plus wheat in the 1988/89 combined marketing years will likely fall 17 percent from the 153.3 million metric tons of 1987/88.

Corn sweetener production in September 1988-February 1989 rose 3 percent over the same period last year, and could expand even faster in the second half of the marketing year. Corn sweetener prices this year have increased over last year, helping to offset higher corn prices and encourage greater production. Production of ethanol and starch from corn in 1988/89 should about match that of last year.

Feed Grain Supply And Use

World 1988/89 Supply Revised Upward, But Use Holds Steady

This report is based on an assessment of U.S. and international supply and demand factors in early May, and updates the February *Feed Situation and Outlook*, which reflected conditions in early February. Late summer and early fall growing conditions in the Southern Hemisphere led to improved prospects for corn production in Brazil and South Africa, more than offsetting a decline in corn and sorghum prospects in Argentina. South Africa now has expectations of a bumper corn crop, but a late harvest likely will shift most of the impact of their increase in exports into the first half of the U.S. 1989/90 crop year.

World use is estimated at 802.2 million metric tons, largely unchanged from last February's estimate; however, some important changes have been made within the forecast world pattern of use. The forecast use in foreign countries has been increased by almost 8 million tons. For the United States, forecast feed use was reduced more than 9 million tons, but food, seed, and industrial (FSI) use was raised 1.6 million. The rise in forecast foreign use also is expected to boost U.S exports by nearly 4 million tons above the February 1989 forecast.

Based on the above supply and demand revisions, world ending stocks for 1988/89 are now forecast to total 135.2 million metric tons, down almost 37 percent from last year's 213.6 million tons and the lowest since 1983/84's 110.7 million tons. The United States will account for more than 90 percent of the drop in world stocks during 1988/89. The global stocks-to-use ratio in 1988/89 would be 16.9, also the lowest since 1983/84, when stocks equaled only 14.6 percent of use.

The U.S. supply of course grains for 1988/89, as an aggregate of the respective crop years, is 285 million tons (beginning stocks, 134.1; production, 149.6; and imports, 1.3). Forecast disappearance for 1988/89 (including exports) has been reduced to 223 million tons from the February estimate of 227 million. Expected U.S. ending stocks at 61.9 million, are almost 4 million above the February forecast. Thus, U.S. stocks are not forecast to be down as much as earlier anticipated.

World Production, Use, and Stocks Likely To Rise In 1989/90

World production is projected at 824 million tons for 1989/90, 100 million above 1988/89 production. The United States will likely account for 84 million tons (84 percent) of the increase.

World domestic use is projected to total 820 million tons in 1989/90, an increase of 17.5 million tons from 1988/89.

Table 1--World and U.S. coarse grains supply and use

	Supply			Use		Ending stocks
	Beginning stocks	Production	Imports	Feed	Total	
	Million metric tons					
World:						
1987/88	233.8	792.7	94	542	812.9	213.6
1988/89 1/	213.6	723.8	109.2	529.4	802.2	135.2
1989/90 2/	135.2	823.9	105.5	545.1	819.7	139.3
Foreign 3/:						
1987/88	81.3	576.8	92.9	393.2	630.1	79.5
1988/89 1/	79.5	574.3	107.9	407.5	641.9	73.3
1989/90 2/	73.3	590.3	104.6	415.3	650.2	70.1
United States:						
1987/88	152.6	215.9	1.1	145.8	182.8	134.1
1988/89 1/	134.1	149.6	1.3	121.9	160.4	61.9
1989/90 2/	61.9	233.6	0.9	129.8	169.6	69.3

1/ Estimated. 2/ Forecast. 3/ Foreign coarse grain data include millet.

Domestic use in foreign countries is projected to rise a little over 8 million tons, and in the United States slightly over 9 million. World trade is expected to decline and U.S. exports likely will also decline in total and in market share.

Corn

March 1 farm and off-farm stocks of corn equalled 5.2 billion bushels, leaving a disappearance for the December-March quarter of nearly 1.9 billion bushels, down 12 percent from the more than 2.1 billion bushels of disappearance a year earlier. FSI use rose slightly, exports were up almost 25 percent, but feed and residual use dropped over 25 percent.

Ethanol Production Boosts FSI Use

At the beginning of the 1988/89 crop year, production of corn sweeteners and starch were expected to continue to grow during the year. Conversely, the higher corn prices were projected to reduce the use of corn for ethanol production and the total FSI use. Contrary to expectations, however, as data have become available on ethanol production, they have demonstrated that corn use in ethanol production

Table 2--Corn supply and use, December-March

Item	1987/88	1988/89
	Million bushels	
Supply:		
Stocks Dec. 1	9,771.0	7,071.6
CCC	1,683.4	611.0
FOR	1,494.2	1,077.4
Loan	2,841.5	747.9
Free	3,751.9	4,635.3
Imports	.9	1.5
Total supply	9,769.4	7,073.1
Disappearance:		
FSI	282.0	284.0
Exports	408.3	508.3
Feed and Residual	1,443.8	1,076.2
Total	2,133.8	1,869.3
Stocks March 1:	7,635.6	5,204.6
CCC	1,767.7	465.0
FOR	1,481.3	995.3
Loan	2,963.7	1,062.5
Free	1,422.9	2,681.8

is not decreasing. Also, a rise in unleaded gasoline prices and a drop in corn prices aided the ethanol industry. The price of unleaded gasoline rose about 8 percent from mid-August 1988 to the first week in March 1989, and the price of corn at Central Illinois elevators dropped about 12 cents a bushel from the August-October average to the November-January average. These factors increased marketer margins for ethanol, particularly for mid-range octane gasoline. The estimated FSI use was up 5 million bushels for the September-November quarter and is forecast to be 30 million higher for the 1988/89 crop year than in 1987/88.

U.S. Corn Exports Largest Since 1980/81

Near record imports of corn by the USSR are boosting U.S. exports to their highest level since 1980/81. U.S. corn exports this year are forecast to total 2.1 billion bushels, 21 percent above last year. Over 1.4 billion bushels had been exported through early May 11, and orders were on the books for an additional 370 million. Thus, almost 300 million bushels in new sales are needed to reach the forecast. On the corresponding date last year, a little over 1.2 billion bushels had been exported and outstanding sales amounted to 309 million, leaving 210 million required in new sales. To meet this year's export forecast, net new sales of old crop corn for the balance of the crop year will have to exceed year-earlier sales by one-third or more. Thus, new export sales will represent more buying pressure on price this spring and early summer than last year, but seasonally the buying pressure will decrease greatly from the level during January through April 20 of this year, when net new sales totaled 558.5 million bushels.

Second Quarter Feed Use Down 25 Percent

December-February feed and residual disappearance was slightly below 1.1 billion bushels, down 25 percent from the more than 1.4 billion for the same quarter last year. This brings the drop in feed and residual use for the first half of the 1988/89 from year-earlier use to 530 million bushels. This large drop seems to be the characteristic of feed and residual disappearance in drought years.

The grain-consuming animal units (GCAU's) for 1988/89 are forecast to total 76.6 million units, the same as in 1987/88. The ratio of the Index of Prices Paid for feed to the Index of Prices Received for Livestock and Products for the October 1988-April 1989 period averaged 0.91, compared with 0.74 a year earlier. This increase indicates that feed costs are rising relative to livestock prices, and would be consistent with a decline in the feed fed per animal. However, slaughter weights and milk production do not reflect such a decline.

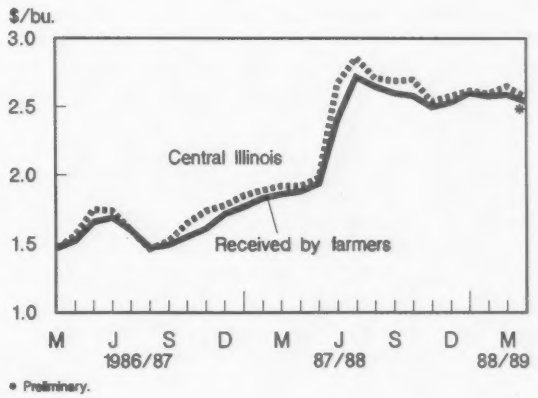
For the 5 crop years of 1983/84-1987/88, the feed and residual disappearance for the first half of the crop year ranged between 60.6 and 62 percent of the year's total. Based on the lower end of this range, and September-February disappearance, the 1988/89 feed and residual would total almost 4 billion bushels, a decline of 735 million from 1987/88. For the droughts of 1974, 1980, and 1983, the feed and residual disappearance dropped an average of 698 million bushels from the year preceding the drought.

Prices More Sensitive to Weather than in 1987/88

Prices of old crop corn are always sensitive to weather during the growing season, but with expected ending stocks 2.5 billion bushels below a year earlier, prices likely will be even more sensitive than last year. However, the following factors have also changed since last year:

- Unencumbered stocks plus 9-month loans are sufficient to meet this year's needs and current prices are above loan redemption prices. Last year, unencumbered stocks were short of needs and prices were rising towards redemption levels for outstanding loans.
- Late spring and summer pressure from purchases for export will be greater this year.
- Subsoil moisture was severely depleted in the Corn Belt by last year's drought, and has not been completely replenished in the Western Corn Belt States.
- Maturing regular and farmer owned reserve (FOR) loans are not expected to be extended and the volume of maturing loans will increase each month from now through the peak of the harvest season.

Figure 1
Monthly Average Corn Prices



* Preliminary.

Available supplies seem adequate to meet market needs; however, how much spot corn prices are pushed up by buying for export and domestic needs will depend on sellers. Uncertainty over the 1989 crop because of weather raises the question of the willingness of sellers to sell. With the market so sensitive to planting and growing conditions, any deterioration in growing conditions likely will decrease sellers' willingness to part with stocks of old crop corn and will result in a rise in the spot cash market and deferred futures prices. Conversely, improvement in growing conditions likely will increase their willingness to move old crop corn, and prices would therefore weaken. If average temperatures and rainfall prevail over the Corn Belt during June and the first half of July, prices likely will start dropping towards their harvest level. The rate of price decline likely would accelerate in August as farmers increase the volume of loans redeemed and sold. Some FOR loans may be exchanged for generic certificates; however, the quantity of certificates currently available is limited and no announcement has been made of pending new issues, beyond a mid-May release of about $850 million. Most maturing FOR loans likely will be forfeited to the Commodity Credit Corporation (CCC).

Normal Growing Conditions Likely To Increase Stocks Slightly

In early March, farmers reported intentions to plant 73.3 million acres to corn this spring, an 8-percent increase from that planted last year. If these intentions are realized, and temperature and rainfall for the major growing States are about average during June and July, this year's corn crop is projected to reach 7.8-7.9 billion bushels. Adding beginning stocks of 1.8 billion bushels and a small amount of imports, the potential supply for 1989/90 would equal nearly 9.7 billion bushels.

Total use for 1989/90 is projected at 7.45 billion bushels, about 100 million more than expected 1989/90 use. An increase in domestic use of 200-300 million bushels will likely offset a decline in exports of 100-200 million. FSI use should rise to about 1.3 billion bushels in 1989/90, and feed and residual use to 4.2 billion. In past post-drought years, the diminished feeding activity, especially for hogs, that resulted from negative returns to feeding during the drought year carries over into the subsequent year because of biological time lags in livestock production.

Foreign production of coarse grains is projected to rise about 3 percent in 1989/90, but the major export competitors may have increases of almost 12 percent. The higher production in the foreign importing countries likely will reduce total trade in coarse grains, and greater production among exporting countries will mean more competition for U.S. exports. U.S. corn exports are forecast at 1.95 billion bushels for 1989/90, 7 percent below what is forecast for this year.

The projected supply and use for 1989/90 boosts ending stocks to 2.2 billion bushels, up 22 percent from the 1.8 billion expected earlier this year. With total disappearance forecast at 7.45 billion bushels, ending stocks would be 30 percent of use. In the past, an ending stock-to-use ratio of this magnitude has driven the average farm price to near the floor provided by the loan rate, except when generic certificate exchanges drove the price below loan or drought pushed the season average price substantially above loan. The price range for 1989/90 is projected to range from $1.65-$2.05, one-third below this year's range of $2.45-$2.70. The loan rate for 1989/90 is $ 1.65 and USDA has not declared any intent to issue a large quantity of certificates for 1989/90.

Sorghum

The sorghum supply for 1988/89 equals 1,240 million bushels, comprised of 663 million bushels of beginning stocks and 578 million of production. However, much of the carryin stocks for 1988/89 were tied up in CCC inventories and FOR.

As of May 10, 1988, 40.4 million bushels of 1988-crop sorghum had been placed under loan, down sharply from the 357.1 million of 1987-crop sorghum placed last year. Higher prices received by farmers made placing sorghum under loan less attractive. In addition, 14.9 million bushels of 1988 crop sorghum has been redeemed, leaving outstanding loans of 25.5 million.

By early May 1989, combined stocks of CCC inventory, FOR, and 9-month loans amounted to about 475 million bushels. Exports for September-March totaled 188.3 million bushels, 42 percent above the same period last year. From September through November (the latest period for which data are available) the Bureau of Alcohol, Tobacco, and Firearms reported 7.5 million bushels of sorghum used in making distilled spirits, way above the 1.5 million used during the same period in 1987. This jump appears to be associated with a fuel grade alcohol plant operating in the sorghum production area. Local prices for sorghum relative to corn seem to favor sorghum—hence the increase in use.

Sorghum prices have increased because of smaller supplies and higher corn prices. However, corn prices have increased relative to sorghum. In the 1986/87 marketing year, prices for No. 2 yellow corn at Kansas City were 7 percent per cwt higher than no. 2 yellow sorghum, and in 1987/88, 11 percent higher. From September 1988 through April 1989, corn prices were 13 percent higher than sorghum. Flaked corn contains only 3 percent more metabolizable energy than flaked sorghum in cattle rations, so this factor alone does not explain the price premium.

Planting Intentions Up

In early March, farmers indicated intentions to plant 11.8 million acres of sorghum this year, 14 percent above the 10.4 million planted last year. Among the top five producing States, farmers plan to increase acreage planted by an average of 16 percent.

Based on these planting intentions and trend yields, the sorghum crop could total 700 million bushels this year. Beginning stocks are projected to be 405 million bushels, which would put the total supply of sorghum for 1989/90 at 1,105 million bushels, 11 percent below 1988/89. However, almost all of the carryin stocks will be tied up in CCC inventory or FOR, leaving free stocks tight. However, with larger corn supplies and lower corn prices, sorghum prices are projected to decline to an average of from $1.55 to $1.95 per bushel.

Barley

Total barley supply in 1988/89 is estimated at 624 million bushels, down 255 million from last year. Most of the reduction in supply (239 million bushels), can be attributed to the drop in production. The number of acres planted in 1988 were down only 12 percent from 1987, but with the drought, only 78 percent of the acreage planted was harvested (91 percent in 1987), leaving harvested acres down 25 percent from the year before. The impact of the drought was also evident in the yield per harvested acre: 38.6 bushels in 1988 compared with 52.7 in 1987.

Total use in 1988/89 is projected at 460 million bushels, down 18 percent from a year earlier. Drops in feed and residual, plus exports will more than offset an increase in food and industrial use. In June through November 1988, food and industrial use of barley climbed 3 percent from the same months in 1987. The brewing industry accounted for most of the increase, because more barley was used to make malt. For the marketing year as a whole, food and industrial use is expected to continue the increase started in the first half.

Ending stocks of barley in 1988/89 could plummet to 164 million bushels, down 49 percent from a year earlier. Stocks of barley on March 1, 1989 totaled 280 million bushels, down from 372 million in December 1988. If use increases seasonally, as in 1987/88, total fourth quarter disappearance will be up slightly from the third quarter.

A total of 21.9 million bushels of 1988-crop barley—7.5 percent of production—were placed under loan by May 10, 1989. Stronger prices have reduced the incentive for producers to place their barley under loan. Of the 1987 crop, 122.7 million bushels of barley were put under loan. Last year at this time, 62.4 million bushels of the current crop were still under loan, compared with only 8.7 million outstanding in the 1988-crop barley. Stronger cash prices have resulted in redemptions of outstanding loans, with 10 million bushels currently outstanding compared with 97.9 million bushels last year at this time. FOR barley stocks equal 45.2 million bushels, down from 112.1 million a year ago. On May 1, 1989, CCC-owned inventory (including 25.5 million bushels committed to the Emergency Feed Assistance Program) stood at 30.5 million, down 22.3 million from 1988.

In April, the preliminary weighted average price received by farmers for all barley in the 1988/89 marketing year of $2.82 a bushel was reported. This price was $1.01 per bushel above the 1987/89 price received by farmers, and $1.38 above the loan rate of $1.44. The preliminary average price received by farmers for feed barley was $2.28, also well above the loan rate. These prices explain the reduced level of loan activity in the 1988 crop. The drought not only reduced supplies and boosted prices, but also widened the spread between malting and feed barley. The spread in the 1987 marketing year was $0.37 per bushel, but it rose to an average of $1.00 this year. The drought hurt the barley quality, thus reducing the supply of barley suitable for malting. In addition, there are few other grains that the malting industry uses to make malt. Feed barley, on the other hand, competes with corn and other coarse grains. However, the ratio of the average price of feed barley relative to corn in June 1988-April 1989 was 0.98, up from 0.89 last year, and above the energy-value ratio of 0.8.

Planting Intentions Down

The March planting intentions report indicates barley producers expect to plant 9.6 million acres in 1989, down slightly from last year. In the past, intentions have been a good indicator of the July estimated plantings.

The top five States in planted barley acreage in 1988 have producers who plan to plant 110,000 more acres in 1989 than last year. Producers in North Dakota plan to plant 8 percent more acres, and those in Idaho expect to plant 7 percent more. Producers in South Dakota plan no change in acreage. Declines in acreage planted are planned in Montana (down 6 percent) and Minnesota (down 4 percent).

First Projections of 1989/90 Supply and Demand

Total barley supply is projected to reach 624 million bushels, the same as 1988/89. Beginning stocks may total 164 million bushels, down from 321 million in 1988/89. With average temperature and rainfall, production is expected to soar 55 percent above 1988's drought reduced level, even with slightly fewer acres planted.

Feed and residual use in 1989/90 is projected at 220 million bushels, up slightly from this year. FSI use will likely be the same as 1988/89. Exports in 1989/90 are expected to be about the same as this year. If these expectations, as well as

beginning supplies, are realized, ending stocks may slip to 144 million bushels.

Oats

Total oats supply for 1988/89 will probably drop to 391 million bushels, down sharply from last year's 553 million. On June 1, 1988, beginning stocks were only 112 million bushels, down from 133 million a year earlier. The drought sharply cut production to 219 million bushels from 374 million in 1987. Strong demand for specialty feeds and food uses has boosted prices and encouraged greater imports. In 1988/89, imports could reach 60 million bushels, up from 46 million last year.

Total oats use in 1988/89 is expected to fall to 302 million bushels, down from 441 million in 1987/88. Feed and residual use will drop sharply in 1988/89 because of limited supplies and relatively high prices. FSI use will probably climb to 100 million bushels from 79 million last year. If supply and use meet expectations in 1988/89, stocks on June 1, 1989 will total 89 million bushels, the lowest beginning stocks of oats since July 1, 1935, when there were 79 million bushels.

The preliminary weighted average oats price for the 1988/89 marketing year is $2.62, up sharply from 1987/88's $1.56. The ratio of the average price of oats received by farmers relative to corn in June 1988-April 1989 was 0.97, about the same as 0.98 last year—well above the normal 0.5 to 0.55 range derived from comparing the feed energy values of the two grains.

Planting Intentions Down

Oats producers expect to plant 13.2 million acres in 1989, down 5 percent from 1988. Last year's reported intentions were 2.4 million acres above the planted acreage, whereas 1987 intentions were 2.3 million below.

Of the top four producing States in 1986 and 1987, only the Dakotas plan to expand oats production to a total of 300,000 acres. Minnesota plans to hold production area constant; Iowa and Wisconsin expect to reduce plantings. Some of these reductions may be associated with the use of oats as a cover crop on acres idled under Government programs.

1989/90 Supply and Demand Estimates

Oats supply in 1989/90 is projected to total 549 million bushels, up sharply from this year's 391 million and only slightly below 1987/88. With beginning stocks expected to be down 23 million bushels, the increase will come from greater production of 420 million bushels—up 92 percent or 200 million bushels from 1988. The current near normal cumulative precipitation for January through April for the Dakotas and Minnesota suggests conditions for oats production have improved since last year. However, Wisconsin, another top oats producing State, has below normal cumulative precipitation. Imports may slip from 1988/89 levels, especially if production goes up and prices slip from this marketing year's highs.

Total oats use in 1989/90 is forecast at 432 million bushels, up from 302 million this year. FSI use is expected to outstrip that of 1988/89 by 10 million bushels, on the strength of continued increase in food demand for oats. Feed and residual use is expected to exceed this year's level, but should remain well below historical levels of 400 to 500 million bushels. Prices are projected to decline to $1.45 to $1.85 per bushel from $2.62 in 1988/89.

Hay

Hay stocks on May 1 were reported at 17.6 million short tons, down 35.6 percent from a year earlier. Disappearance of hay for December-April totaled 73.3 million tons, down 20.8 percent from the 92.5 million during the same period last year. For the 1988/89 crop year (May-April), use was 136.5 million tons, down from the 1987/88 disappearance of 154.2 million.

Roughage-consuming animal units (RCAU's) for the feed year 1988/89 (September-August) totaled 77.7 million units, compared with 77.3 million last year. While the number of RCAU's stayed about the same, a slight increase occurred in beef cattle other than those on feed. Consumption per RCAU in 1988/89 slipped to 1.76 tons from 2 tons in 1987/88. The drought reduced the supply of pasture, so hay was fed in some areas during the summer. The short hay crop pushed up prices, encouraging careful feeding and greater use of crop residue pasture.

Prices received by farmers for hay averaged about $87.10 per ton in 1988/89, up from $65.10 a year earlier. Hay prices in 1988/89 have stayed above 1987/88 throughout the year, and have continued to climb. In addition, prices for alfalfa hay, preferred by dairy farmers, have been especially strong and during May-April, averaging $22 per ton more than other hay.

In early March, farmers reported intentions to harvest 63.1 million acres of hay in 1989, down 4 percent from the 65.6 million acres harvested in 1988. Farmers harvested more acres in 1988 than they intended to in March, probably because restrictions against harvesting set-aside land were lifted in areas impacted by the drought. Thus far in 1989, 442 counties in 15 States have had these restrictions lifted on ACR and CU land, and consequently the acres harvested this year may also exceed early intentions.

If harvested acres equal intentions and the average yield for recent years is realized, the hay crop would total about 154 million tons. With carryin stocks of 17.6 million tons, the supply for 1989/90 would be about 172 million, 11 percent

more than on hand for 1989/90. With RCAU's about the same as last year, supply per RCAU will be more than in 1988/89.

Feed Demand

Feed and residual use of the four feed grains plus wheat in 1988/89 is forecast to fall 17 percent from the 153.3 million metric tons of 1987/88. This is the largest decline in feed and residual use since the 14-percent drop associated with the sharp increase in grain prices in 1983/84, when the index of prices paid by farmers for feed climbed 16 points from a year earlier. The number of GCAU's in 1983/84 declined 1 percent from the year before, but GCAU's in 1988/89 will likely remain unchanged from last year.

Feed and residual use of corn in September 1988 through February 1989 has decreased 18 percent from the same period last year. In 1987/88, corn comprised 78 percent of the total feed and residual use, but for 1988/89, may account for nearly 84 percent. However, the index of prices paid for feed in September 1988 through April 1989 jumped 31 points, compared with 10 points last year and nearly 22 points in 1983/84.

In January-March 1989, the number of dairy cows was 1 percent below last year. However, the daily rate of milk production per cow was up over 3 percent, supported by an increase in grain and other concentrates fed. On April 1, producers reported feeding 17.7 pounds of concentrates per cow per day, up from 17.5 pounds a year earlier. Concentrate feeding should remain at relatively high levels as feed prices moderate this summer.

The number of cattle on feed April 1, 1989 rose 3 percent from last year, after being down 4 percent on January 1. Fed cattle marketings during January through March were 4 percent below last year. Feed demand was likely boosted by the additional placements in the first quarter, amounting to an increase of 7 percent from last year. However, cattle continue to be placed on feed at heavier weights. These cattle on feed will probably increase marketings from a year earlier during April through July, pulling numbers of cattle on feed below year-earlier levels in the last half of 1989.

Feed demand estimated from the number of hogs should exceed that of 1987/88, mainly because of the added hogs fed early in the current feed year. The December 1, 1988 inventory of market hogs was 1.7 percent above last year. Hog producers are reducing the number of sows farrowing in response to higher costs, but much of the effect will be felt in the 1989/90 feed year. In December 1988 through February 1989, the number of sows farrowed dipped 2 percent; also, producers reported intentions to decrease farrowings 3 percent in March through May, and 4 percent in June through August. The pig crop in December through February declined only 1 percent from last year because the number of pigs per litter increased. Thus, reduced farrowings through August may not translate into similar declines in the pig crop.

In the poultry sector, broiler and turkey producers will likely increase their feed demand over last year, but egg producers will probably decrease their demands. The average number of layers on hand during September 1988 through February 1989 was 4 percent below last year, and the number of eggs produced was also down 4 percent. The latest available data for March show that these declines have continued, with hen numbers and egg production each down 4 percent from a year earlier. Current forecasts for 1989 suggest that these trends will persist.

In late 1988 and early 1989, prices for broilers have remained strong relative to last year, and offset the increased costs from stronger feed prices. Consequently, producers have been encouraged to expand production, with broiler output in 1989 expected to increase 5 percent. Estimated returns to turkey producers were favorable in the second half of 1988, but negative in first quarter 1989. Still, favorable returns in the primary marketing season may increase output about 2 percent from 1988.

Food, Seed, and Industrial Use of Corn

FSI use of corn during September 1988 through February 1989 rose slightly from the corresponding period a year earlier. FSI use will probably increase 4 percent in the remainder of the marketing year from the same period a year earlier. In the first half, sweetener production (high fructose corn syrup (HFCS), glucose, and dextrose) has been up 3 percent from last year. If the usual seasonal patterns exhibited in past years prevail in 1988/89, sugar production will expand even faster in the second half, and may result in a yearly gain of 5 percent above a year earlier. This expected increase may be concentrated in the wet milling industry, producers of HFCS, glucose, and dextrose.

Midwest prices for 42-percent HFCS began climbing in late March 1988, and peaked at 15.34 cents per pound in July and August 1988. Prices then declined to 11.5 cents per pound in January through March 1989 before rising again to over 13 cents in April. Despite the stronger prices, use (and therefore production) increased from last year during the period. Thus the current increase in price will probably not cause a decline in production.

Ethanol production is expected to be about the same as last year. Gasoline price increases have allowed fuel ethanol prices to rise 15 to 20 cents per gallon. This has reduced financial stress in the ethanol industry resulting from higher

Table 3--Corn: Food, seed, and industrial use 1/

Year beginning September 1	Wet-milled products				Dry-milled products			
	HFCS	Glucose and dextrose	Starch	Alcohol	Dry-milled alcohol	Dry-milled and alkaline cooked products	Seed	Total
	Million bushels							
1975	45	162	116	5	20	154	20	522
1976	62	164	116	10	15	155	20	542
1977	80	170	124	10	20	158	20	582
1978	105	170	124	15	20	155	20	609
1979	127	170	120	25	20	158	20	640
1980	165	183	120	35	35	160	20	718
1981	185	183	130	83	35	162	19	797
1982	215	188	127	130	50	170	15	895
1983	256	189	147	150	50	164	19	975
1984	310	187	143	170	100	160	21	1,091
1985	328	188	152	185	127	161	19	1,160
1986	339	185	155	200	135	161	16	1,191
1987	359	187	167	200	136	163	17	1,229
1988 2/	375	196	166	200	134	165	19	1,255

1/ Data are estimates based on production and sales figures from Government and private industry.
2/ Projected.

corn prices induced by the drought. Some small plants that closed last summer could reopen. Wet millers will probably repeat their past practice of reducing ethanol production and increasing HFCS production during the summer months.

Starch production during September 1988 through February 1989 is estimated to be nearly the same as last year. Starch demand tends to rise with increased sales of final products containing starch—clothes, paper, packaging, building materials.

World Coarse Grain Outlook

Global production of coarse grains should increase sharply in 1989/90, mainly because of a large rebound in U.S. crops. Foreign production gains are also expected, but on a smaller scale. World production is projected at 824 million tons, up 100 million from 1988/89 and the highest since 1986/87.

Global consumption is projected to expand about 2 percent to a record 820 million tons, surpassing the previous high of 1987/88. Although anticipated gains in the United States account for most of the year-to-year increase, foreign use should also go up slightly. This will be the fourth consecutive foreign consumption record, although the annual increases have been relatively small.

Additional coarse grain supplies are likely to bring some reduction in export prices in 1989/90. Although world trade will probably dip from 1988/89, it should stay relatively high at 95 million tons.[1] Limited supplies and continued high prices of feed quality wheat will support trade in coarse grains.

The narrow margin between world output and use projected in 1989/90 will permit only limited stock rebuilding, following 2 years of stock decreases. Nevertheless, the world wheat market is considerably tighter; use is forecast to outstrip production again in 1989/90, causing a further drawdown of wheat stocks.

Foreign Production Likely To Rise 3 Percent

The initial projection of foreign coarse grain output for 1989/90 is 590 million tons, an increase of 16 million over 1988/89. This outturn would be a record, topping the old high of 583 million reached 3 years earlier. Area is expected to fall slightly. Average foreign coarse yields are projected to rise about 4 percent to a record. The projected yield is close to the 30-year trend.

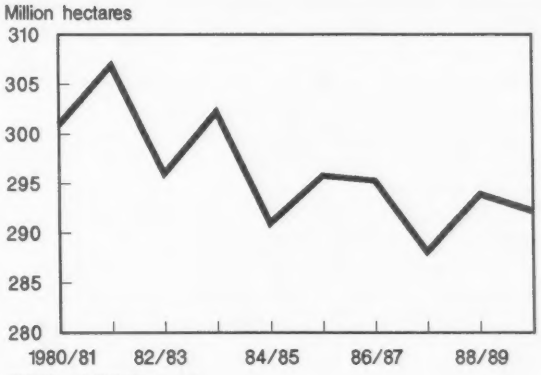
These early season projections are highly tentative since crop planting is still underway in the Northern Hemisphere, and remains several months away for most Southern Hemisphere crops. In recent years, USDA's initial projections of foreign coarse grains crops—based on normal weather assumptions—have tended to exceed the final estimate.

The largest production increases will likely take place in the Soviet Union, Eastern Europe, Argentina, China, and Canada. Improved yields are expected in each case, based on recovery from adverse weather. Area is also projected up in Argentina, China, and Canada.

The most significant production declines will probably occur in the European Community (EC), South Africa, Sub-Saharan Africa, India, and Turkey. In the EC, reduced coarse grain area accounts for a large portion of the forecast

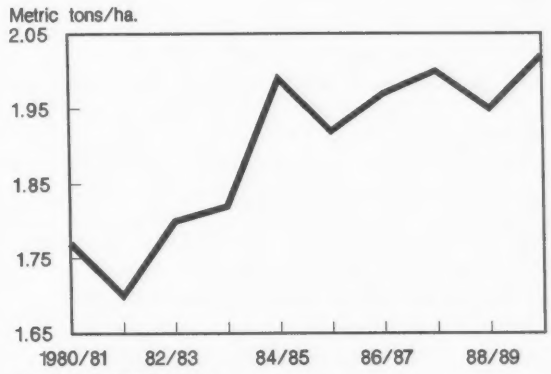
[1] All trade years referred to in this section are October-September and exclude intra-EC trade unless otherwise specified.

Figure 2
Foreign Coarse Grains: Area Harvested



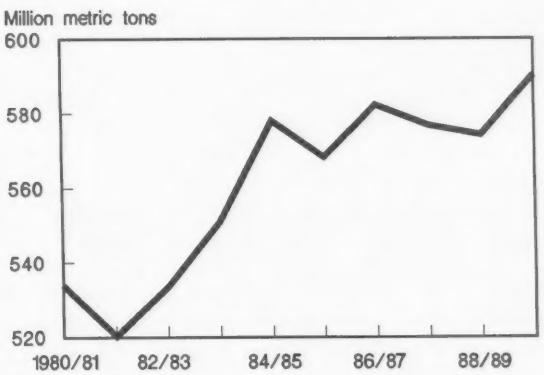
1988/89 and 1989/90 forecast.

Figure 3
Foreign Coarse Grains: Average Yields



1988/89 and 1989/90 forecast.

Figure 4
Foreign Coarse Grains: Production



1988/89 and 1989/90 forecast.

drop in output, reflecting some shifting to wheat. In South Africa, a return to more normal weather will lower crops after exceptional 1988/89 conditions. Similarly, production declines are likely in Sub-Saharan Africa after excellent weather produced record harvests in 1988/89. After surging nearly 40 percent in 1988/89, coarse grain production in India could fall because of a small drop in area. In Turkey, and also in Syria, production will decrease because of poor weather that has hurt winter barley.

Among the individual foreign crops, the biggest gains are projected in corn production, up nearly 9 million tons (3 percent); barley, up 5.5 million tons (3 percent); and oats, up nearly 3 million tons (8 percent). Increased yields account for virtually all of the additional production, since area will likely fall for barley and increase just marginally for corn and oats. Average yields for both corn and barley are projected to eclipse previous record highs. Little change is expected in foreign production of sorghum and rye, while millet is projected down 6 percent.

Favorable Outlook for Soviet Crops

Despite some reduction in coarse grain area, Soviet production is projected to rise 8 percent in 1989/90 to 105.5 million tons. Wheat production is also projected up about 8 percent. Total estimated grain area remains virtually unchanged from last year. Forage area will continue high at the expense of grains. Fallow area, up considerably in recent years, appears to be leveling off.

The 1989/90 total grain crop for the Soviet Union is projected at 210 million tons, compared with an average output of 205.5 million for the previous 3 years. This is the second year in a row that USDA's initial forecast of the Soviet crop has been over 200 million tons. There has been a small increase in the Soviet grain crop in recent years: production for the previous 5 years (1984-1988) averaged 196 million tons, and for the previous 10 years (1979-1988), 187 million.

Competitor Corn Crops Generally Higher

For the most part, major foreign exporters are expected to boost production. Total coarse grain output will be up, as increases in competitor corn and sorghum more than offset a decline in barley.

A net increase in production of about 3 percent appears likely for the three traditional corn competitors—Argentina, Thailand, and South Africa. Argentina's 1988/89 harvest, which has just been completed, is its worst in more than 25 years due to the drought. In 1989/90, normal weather should lead to a rebound in yields and less abandonment. Corn output is therefore projected to soar 70 percent to 8.5 million tons. Great uncertainty surrounds the estimated area. Very unsettled economic conditions, including wild inflation, and

Table 4--Foreign coarse grain production: Selected countries and regions, 1985/86 - 1989/90

Country	1985/86	1986/87	1987/88	1988/89 (Forecast)	1989/90 (Projected)
			Million metric tons		
CORN					
Argentina	12.4	9.3	9.0	5.0	8.5
Brazil	21.0	26.5	24.7	24.0	24.0
China	63.8	70.9	79.8	75.0	78.5
Eastern Europe	30.6	38.9	30.0	27.0	33.3
EC-12	25.7	25.2	25.9	28.5	26.5
India	6.6	7.5	5.5	8.0	7.8
Mexico	10.5	10.0	9.9	10.1	10.3
South Africa	8.1	7.2	7.1	11.0	8.0
Thailand	5.4	4.3	2.7	4.3	4.5
USSR	14.4	12.5	14.8	16.0	15.5
Total foreign	254.3	268.1	268.0	268.2	276.9
SORGHUM					
Argentina	4.2	3.1	3.0	1.8	3.0
Australia	1.4	1.4	1.4	1.2	1.5
China	5.6	5.4	5.4	5.3	5.5
India	10.2	8.9	9.5	11.5	11.0
Mexico	3.7	4.3	4.0	3.7	4.1
Sudan	3.6	3.4	1.3	4.0	3.0
Thailand	0.3	0.3	0.2	0.3	0.3
Total foreign	41.9	40.6	37.2	41.9	42.4
BARLEY					
Australia	4.9	3.6	3.5	3.3	3.4
Canada	12.4	14.6	14.0	10.1	12.0
Eastern Europe	16.4	16.9	16.3	16.2	16.6
EC-12	51.5	46.8	46.8	50.5	47.5
Other W. Europe	6.6	6.1	5.2	5.7	5.8
Turkey	6.5	6.3	6.0	7.0	6.0
USSR	46.5	53.9	58.4	44.5	52.0
Total foreign	165.1	169.1	169.0	159.5	165.0
TOTAL COARSE GRAINS1/					
Argentina	17.4	13.0	13.0	7.6	12.5
Australia	7.9	6.8	6.9	6.5	6.8
Canada	23.9	25.5	25.5	19.6	23.0
China	82.3	87.0	96.5	91.8	96.2
Eastern Europe	65.5	73.9	64.6	60.5	67.9
EC-12	88.9	81.7	82.4	88.7	83.5
India	25.8	26.6	23.5	32.6	31.7
South Africa	8.9	7.9	7.9	11.7	8.8
Thailand	5.7	4.6	3.0	4.6	4.8
USSR	100.0	105.9	113.7	97.5	105.5
Total foreign	568.4	582.4	576.8	574.3	590.3

1/ Also includes oats, rye, millet, and mixed grains.

competition with soybeans will influence planting decisions, still many months away.

Thailand's 1989/90 corn output may rise 5 percent if greater yields are realized. Area will likely remain flat because of competition from other crops, particularly soybeans. However, current corn prices in Thailand are high, reflecting strong demand for domestic feed. This should stimulate additional input use, and lead to a second straight record yield in 1989/90. Use of modern inputs, including hybrid seed, is usually very limited in Thailand.

Corn production in South Africa is forecast to reach 11 million tons in 1988/89, the highest in 8 years, because an excellent rainy season and cool temperatures boosted yields to the second highest level on record. Although producer prices will be cut this year because of a policy linking prices to the size of the crop, farmers incomes should still be raised by the larger volume of sales. For 1989/90, a return to average conditions will reduce yields and production, forecast at 8 million tons. Despite the minimal influence it seems to exert on farmers' decisions, the Government remains committed to diversifying crops and thus producing less corn.

In China—the world's third largest corn exporter over the last 5 years—corn production is projected to increase nearly 5 percent, due to expanded area and slightly better yields. Farmers will probably return some of the corn area shifted into cotton in 1988 back into corn in 1989 in response to relatively better incentives for grains.

Corn output in the EC is projected to fall 7 percent from the record set in 1988/89, assuming yields fall from record levels and area declines. The EC has recently emerged as a significant corn exporter to non-EC countries. The bumper 1988/89 crop included record production in France, the biggest EC producer, and in Spain, the third largest. EC corn yields have been increasing at a torrid pace, virtually doubling in the last 2 decades. The average EC yield was about 113 bushels per acre in 1988/89; in France, it nearly reached 117 bushels.

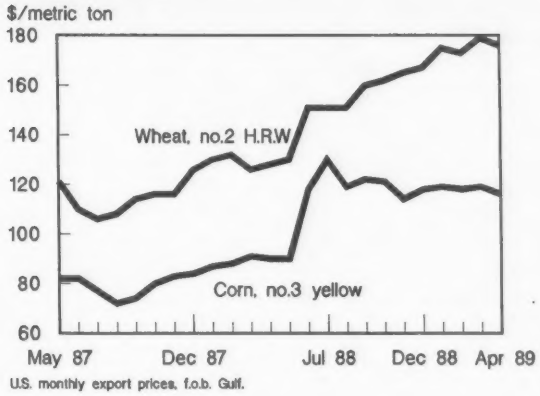
Competitor Sorghum Up Sharply, Barley Down

Among the major sorghum competitors (Argentina, Australia, China, and Thailand) aggregate production should jump 20 percent from 1988/89. As with corn, Argentina's sorghum crop should rebound because of better yields and reduced abandonment. Favorable prices will likely stimulate a large expansion in sorghum area in Australia, boosting production by 25 percent from the smaller 1988 crop. Higher area had been expected in 1988/89, but unfavorable planting conditions held back sowings. Sorghum production in China and Thailand should show relatively small gains.

Barley production for the major competitors (the EC, Australia, and Canada) is projected to fall about 2 percent in aggregate. A drop in EC production could outweigh gains in Australia and Canada. Lower area accounts for most of a projected 6 percent fall in the EC barley crop. Since peaking in 1979, EC barley area has been trending downward. For 1989/90, part of the falloff can be explained by a shift to wheat, which offers better returns to farmers. In the United Kingdom, part of this area change has been weather related; some wheat area was planted with spring barley in 1988/89 because of poor planting conditions in the fall of 1987.

Recovery from drought is expected to push Canada's barley crop up about 20 percent. An expansion in planted area is forecast, along with a rebound in yields. A minor gain (4 percent) is forecast for Australia because of a rebound in yields, although area planted could slip about 1 percent. More wheat plantings due to higher prices and favorable weather conditions will apparently prevent any increase in Australia's barley area.

Figure 5
Price Spread Between Wheat and Corn Widening



U.S. monthly export prices, f.o.b. Gulf.

Coarse Grains Stocks May Rise Slightly; Other Grains To Tighten

For the next year, the world grain balance is expected to remain tight, with the first projections showing production equal to use. This implies no change in world ending stocks of total grains. Even though total grain production is projected to rebound by 9 percent from the 1988/89 decline, consumption could inch up 1 percent, surpassing the old record set 2 years earlier. World ending stocks for 1989/90 are projected to be the equivalent of only 17.3 percent of total grain use. This would be slightly down from 1988/89, and the lowest since 1974/75.

The wheat and rice outlook is tighter than that for coarse grains. Wheat and rice stocks may fall, while coarse grain stocks are projected to increase 4 percent. Recent price developments provide an indication of the divergent outlook for the different grains. The spread between wheat and corn prices has been widening in recent months (see figure 5). Based on the initial 1989/90 projections, the gap between wheat and corn prices will probably continue to grow as corn prices edge downwards and wheat prices remain firm. In some cases, particularly for the Soviet Union, this will support coarse grain imports.

For world coarse grains, the stocks-to-use ratio for 1989/90 is expected to be virtually unchanged from the forecast 17 percent for 1988/89. This remains well above the recent low of 14.6 percent reached in 1983/84. However, stock rebuilding in the aftermath of the current drawdown will be much more limited than in 1984/85. At that time, stocks went up 33 million tons following a 128-million-ton increase in production. The potential stocks gain in 1989/90 is entirely due to the United States, where a 12 percent increase is forecast. Foreign stocks are expected to drop 4 percent, the fifth consecutive yearly decline.

After declining an estimated 1 percent in 1988/89, global coarse grain consumption is projected to increase 2 percent in 1989/90. Foreign consumption is projected to expand more than 8 million tons (1 percent) to 650 million, the fourth straight annual increase, but a slightly smaller gain than in 1988/89. Compared with the late 1970's, recent growth in foreign coarse grain use has been much slower. Much of this is explained by slower growth in the developing countries, where, outside East Asia, feed demand has been weak. Debt burdens, foreign exchange shortages, and other economic problems constrain growth.

Coarse Grain Trade To Stay High

Following 3 years of no growth, world coarse grain trade is up a forecast 18 percent in 1988/89 to 98 million tons. For 1989/90, trade is projected to slip about 3 million tons, a 3-percent decline. However, this would be more than 10 million tons above the stagnant phase of the 1985-87 period. This is largely because Soviet imports are projected up 8 million tons from the 1985-87 average. Lower sorghum shipments will account for about half of the anticipated drop in 1989/90 trade with smaller declines for corn and barley.

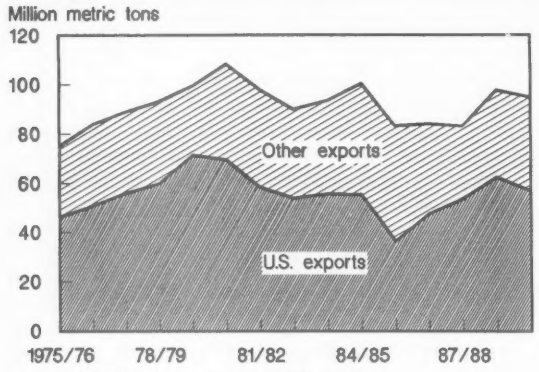
The continuing tightness in the world wheat market and the shortage of feed quality wheat are contributing to buoyant coarse grain trade. Little change is anticipated in the next few months. World trade in feed wheat peaked in 1986/87 at 6 million tons, according to estimates by the International Wheat Council. Trade fell only slightly in 1987/88, but has dropped sharply in 1988/89 as supplies have been limited and prices have soared.

Sharply higher import demand by the Soviet Union has been the driving force behind the 1988/89 spurt in coarse grain trade. Soviet imports are expected to more than double, rising more than 12 million tons from 1987/88, to 23 million tons. Imports for the rest of the world are only forecast to increase slightly, up about 2.3 million tons in 1988/89. In the Soviet Union, the push to increase meat and livestock production decreased availability of forage and other feedstuffs, and the drop in domestic grain output may account for higher demand for imported feed grains.

For 1989/90, the expected decline in world imports is virtually all due to a projected 3-million-ton decline in Soviet imports to 20 million tons. However, Soviet wheat imports are also projected to fall to the lowest level in 10 years. Another important and volatile importer whose import behavior is difficult to forecast is Saudi Arabia. In 1989/90, Saudi coarse grain imports are projected to increase 500,000 tons. Changes in import and subsidy policies have led to numerous adjustments in Saudi barley imports in recent years.

One of the most critical, but less dramatic, developments for world import demand is taking place in Japan. The liberalization of its beef market that has just started is lead-

Figure 6
World Coarse Grain Trade



Excluding intra-EC trade. 1988/89 and 1989/90 forecast.

ing to higher meat imports and is expected to constrain growth in imports of feed grains. Japan, generally the world's largest feed grain market, has had very steady import growth, averaging 3 percent since the mid-1970's. In 1988/89, Japan's imports are forecast to increase only 1 percent to 22.6 million tons, and in 1989/90, imports are projected to be largely unchanged.

U.S. Market Share To Fall

Increased production in several competing exporters, particularly of corn and sorghum, and a small contraction in import demand are likely to erode the U.S. share of the world coarse grain market. U.S. coarse grain exports are projected at 57 million tons in 1989/90, compared with 62.5 million in 1988/89. This implies a 60 percent share, compared with 64 percent in 1988/89.

The largest turnaround expected in 1989/90 is in Argentina, whose corn exports are projected up 80 percent to 4 million tons, and sorghum up 60 percent to 1.3 million. Drought has sharply reduced Argentina's forecast 1988/89 corn exports to just 2.2 million tons, the lowest in nearly 30 years, and its sorghum exports to 800,000 tons, the lowest in about 20 years. Exports would be even lower if domestic use had not declined because of the country's economic crisis. This shortfall has limited potential Argentine exports to the Soviet Union and, to a lesser extent, to Japan. The Soviet Union, Cuba, and Iran will be the leading destinations for Argentina's 1988/89 corn exports, while Japan and the Soviets take nearly all of its sorghum.

In Thailand, rapidly rising domestic feed use is likely to absorb all of the projected increase in 1989/90 corn production. This will likely reduce corn exports about 10 percent to 1.7 million tons. Continued high rice prices will limit the use of broken rice as an alternative to feeding corn. The expansion of Thailand's poultry industry ties in closely with the East

Table 5--World coarse grain trade: Major exporters and importers by commodity, 1985/86-1989/90 1/

Country	1985/86	1986/87	1987/88	1988/89 (Forecast)	1989/90 (Projected)
CORN					
Exporters					
U.S.	31.5	39.4	44.5	53.4	49.5
Argentina	7.4	4.0	3.6	2.2	4.0
China	6.4	3.8	4.1	4.0	4.0
Thailand	3.8	2.6	0.8	1.9	1.7
South Africa	1.5	2.6	0.8	2.0	3.5
Others	3.9	4.1	3.0	3.4	3.2
Total	54.5	56.4	56.8	66.9	65.9
Importers					
Japan	14.6	16.1	16.7	16.7	16.9
USSR	10.3	7.6	8.1	18.4	16.0
EC-12	4.8	2.8	3.3	3.0	3.0
Korea, Rep.	3.6	4.6	5.1	6.2	6.7
Taiwan	3.1	3.5	4.0	4.1	4.2
Mexico	1.7	3.4	3.2	3.3	3.3
China	0.4	1.6	0.2	0.1	0.2
East Europe	2.2	1.7	2.0	2.2	2.0
Brazil	1.9	1.4	0.0	0.1	0.1
Egypt	1.9	2.4	1.4	1.0	1.0
Others	10.0	11.3	12.9	11.8	12.5
Total	54.5	56.4	58.8	66.9	65.9
SORGHUM					
Exporters					
U.S.	4.1	5.1	6.1	8.1	6.5
Argentina	2.2	1.0	1.2	0.8	1.3
Australia	1.1	0.6	0.6	0.6	0.8
Others	1.3	1.2	0.4	1.4	0.9
Total	8.7	8.0	8.2	10.9	9.5
Importers					
Japan	5.1	4.2	3.9	4.2	4.0
Mexico	0.6	0.8	0.9	1.6	1.2
Taiwan	0.8	0.8	0.3	0.2	0.2
Venezuela	0.8	0.8	1.7	1.6	1.4
Israel	0.5	0.2	0.4	0.4	0.4
Others	0.9	1.2	1.0	2.9	2.3
Total	8.7	8.0	8.2	10.9	9.5
BARLEY					
Exporters					
EC-12	7.3	6.2	7.0	10.0	10.0
Canada	4.8	6.0	3.4	3.5	4.0
Australia	3.7	2.2	1.7	1.3	1.4
U.S.	0.8	3.0	2.9	1.0	1.0
Others	1.9	1.2	1.0	1.8	1.0
Total	18.4	18.5	16.0	17.6	17.4
Importers					
Saudi Arabia	6.6	9.0	4.5	4.0	4.5
USSR	2.9	3.0	2.4	3.1	3.0
East Europe	3.3	1.3	1.9	2.4	2.0
Japan	1.5	1.2	1.3	1.2	1.2
Others	4.0	4.1	5.9	6.9	6.6
Total	18.4	18.5	16.0	17.6	17.4
COARSE GRAINS TOTAL TRADE	83.2	84.1	83.1	97.7	94.9

1/ October-September year, excludes intra-EC trade.

Asian feed grain market since Japan takes most of Thailand's exports of chicken meat.

Also important for East Asian markets in 1989/90 will be the expected resurgence of South African corn exports. Much of the surplus from South Africa's current bumper crop will not be exported until 1989/90. Japan and Taiwan have been South Africa's chief markets in most years, in competition with the United States. South Africa's exports for 1989/90 are projected to rise 75 percent to 3.5 million tons, which would be the highest since 1981/82.

As usual, great uncertainty surrounds China's corn export prospects, complicated by policy changes and rising domestic needs. Movement of surplus corn to deficit areas within the country will probably continue to be limited, while ex-

ports bring in valuable foreign exchange. Assuming production is close to projected levels for 1989/90, exports are expected to be equal to the 4 million tons forecast for 1988/89.

U.S. corn exports are projected down 7 percent in 1989/90 to 49.5 million tons. Despite the likelihood of continued robust Soviet demand, there will be increased competition from the other exporters. Total U.S. corn exports in 1988/89 are forecast at 53.4 million tons, the highest in 8 years. U.S. export commitments to the Soviet Union have reached 15.2 million tons as of May 11 (U.S. Export Sales, May 18, 1989), close to the 1984/85 export record of 15.75 million tons.

Although 1989/90 competitor sorghum exports are projected up slightly (200,000 tons), U.S. exports may fall more because of slackening import demand. The large volume of world sorghum trade in 1988/89 is partly explained by favorable prices relative to corn. The Soviet Union has made unusually large purchases, boosting US exports. For 1989/90, U.S. sorghum exports are projected to drop 20 percent to 6.5 million tons, from 1988/89's forecast 8.1 million tons.

The initial projection for U.S. barley is for exports to equal the 1988/89 forecast level of 1 million tons. The barley export outlook centers around the Export Enhancement Program, which accounts for the majority of U.S. sales. The most significant change projected is the retreat of smaller barley exporters, such as Syria, Morocco, and Turkey, in the face of reduced domestic supplies and lower export prices. Increased exports by Canada will offset some of this decline.

The EC is projected to match its forecast 1988/89 barley exports of 10 million tons. Lower export prices would imply increased subsidy expenses. However, the EC has reportedly anticipated this, by allocating more funds for barley while reducing those for wheat subsidies. Continued high wheat export prices will require lower subsidies to move EC wheat into world markets.

An Analysis of Factors Influencing Corn Yields

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Abstract: The 1988 drought renewed interest in the relationship between weather and yields. Regression equations are estimated for U.S. average corn yields. Results illustrate that there is little carryover effect from a drought to yields in the following year—yields tend to rebound to near trend levels following a drought. Soil moisture recharge is an important consideration, but too much moisture in the spring can delay plantings, which typically reduces yields by exposing more of the critical growing stages of the crop to less favorable summer weather. The most important factor in determining corn yields in the year following a drought is weather during the growing season. Timely rains in July are the most critical, with July temperatures next in importance in most years. Other results show that average weather is not necessarily optimal for yields, and that there are more downward risks in yield responses to weather than there is upward yield potential.

Keywords: Corn, yields, weather, planting dates, 1988 drought.

The 1988 drought affected many agricultural production regions in the United States. National average corn yields fell from record levels of 119.4 bushels an acre in 1987 to 84.6 bushels in 1988, one of the largest percentage declines of the century. Unlike many other recent droughts which developed during the months of July and August, an unusual feature in 1988 was the severity of early-season weather through June.

Consequently, the 1988 drought intensified interest in the relationship between weather and yields. This article examines factors which could affect post-drought recovery of U.S. corn yields. Building from an adjusted trend model, the roles of soil moisture recharge, planting dates, and growing season weather are considered. Model forecasts of corn yields for 1989 also are presented.

Adjusted Trend Yields

Trend analysis is used as an initial indicator of yields. Trend terms are typically included in yield analysis to represent productivity gains. Trends also tend to be correlated with fertilizer application rates and, therefore, may also represent the effects on yields of fertilizer use.

However, a couple of additional factors are appropriate for inclusion in trend analysis for corn yields. First, yields will depend on the level of corn acreage. Farm program provisions determine the amount of acreage that program participants may plant. When individual farmers remove land from production to comply with program provisions, they typically idle their least productive acres. As lower yielding land is returned to production under less restrictive farm programs, average yields would be expected to be lower than those attained with that acreage idled. Thus, a greater level of acreage planted with corn would imply a lower average yield.

A second adjustment to a simple trend analysis for corn yields is used to account for the unusual situation in 1983. In that year, a substantial amount of land was idled from corn production under the PIK program, which would have typically been expected to raise average yields. However, the 1983 drought sharply reduced corn yields. To correct for spurious correlation between this reduction in acreage and lower yields, a dummy variable for 1983 is used in this analysis.

The resulting adjusted trend equation for corn yields is:

(1) YIELD = 97.7 + 2.37 TREND - 0.387 ACRES - 35.97 D83
(5.5) (8.1) (1.5) (3.9)

$R^2 = 0.82$ RMSE = 7.2 Estimation period = 1965-1987

where:

YIELD = U.S. average corn yield per harvested acre (bushels per acre),

TREND = an annual trend variable equal to 0 in 1965, 1 in 1966, and so forth,

ACRES = acreage planted with corn in the United States (million acres), and

D83 = a dummy variable equal to 1 in 1983 and 0 elsewhere.

Numbers in parentheses below each estimated coefficient are t-statistics, R^2 is the coefficient of determination, and RMSE is the root mean square error (bushels per acre).

Each estimated coefficient has the expected sign. The coefficient of the trend term implies an annual increase in corn

yields due to productivity gains of about 2.4 bushels an acre. For each additional million acres planted with corn, average yields for corn would be expected to fall by about 0.4 bushels an acre. The coefficient of the 1983 dummy variable implies that 1983 actual yields were nearly 36 bushels lower than would have been expected without the drought. The coefficient of determination means that 82 percent of the variation in corn yields is explained by this adjusted trend equation. The root mean square error is 7.2 bushels an acre.

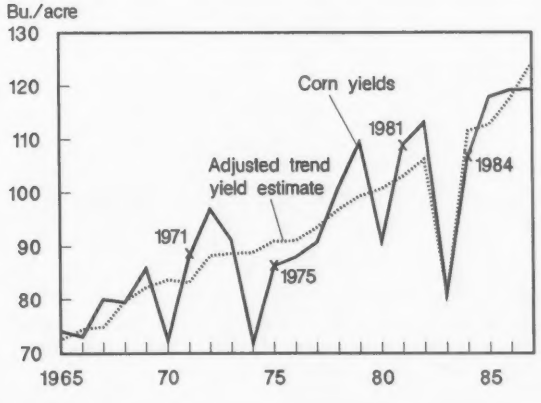
Post-Drought Yield Recovery

Figure A-1 shows actual U.S. average corn yields over 1965 to 1987 along with the adjusted trend estimates resulting from equation 1. Of particular interest, the 4 years in which droughts contributed to significant production shortfalls (1970, 1974, 1980, and 1983) were followed by years of significant recovery in corn yields.[1] Corn yields in 2 of the subsequent years (1971 and 1981) were above the trend estimate, while yields in the other 2 subsequent years (1975 and 1984) fell somewhat short of the trend estimate.

One possible cause of the differing yield recoveries in years following droughts is the degree of soil moisture recharge. Soil moisture is important for crop development because it is a reserve of water that can be used by the crop between rains. Soil moisture levels are depleted during droughts. Consequently, yields in years following droughts would be expected to rebound better when soil moisture levels were replenished prior to plantings.

[1] Factors other than droughts also contributed to some of these production shortfalls. For example, much of the 1970 production shortfall was caused by a corn blight, with about a third of the shortfall due to dry growing-season weather in Missouri and the Central Plains. In this analysis, however, each of these 4 production shortfall years is referred to as a drought year.

Figure A-1
Corn Yields and Adjusted Trend



To examine the soil moisture hypothesis, a 6-month total of average Corn Belt precipitation levels in October through March was calculated for each year.[2] Following the four droughts discussed above, these cumulative precipitation totals represent the potential for soil moisture recharge prior to the next growing season.

Surprisingly, table A-1 shows that the 2 post-drought years in which corn yields recovered to above the trend estimate (1971 and 1981) were preceded by October through March precipitation totals below the 1965 through 1987 average. Also, the 2 post-drought years in which corn yields fell short of the trend estimates (1975 and 1984) had precipitation in the preceding October through March above the longer-run average.

One possible explanation of these surprising results would be that the timing of plantings in years following droughts was affected by the amount of precipitation in the preceding October through March period. Table A-2 shows the portion of the Corn Belt corn crop planted by the middle of May for the 4 post-drought years being discussed. For the 2 post-drought years in which corn yields recovered to above the trend estimate and the preceding October through March precipitation totals were below average (1971 and 1981), mid-May plantings exceeded the average. The below

[2] Weather variables used in this article are from the Automated Weather/Yield System (3). The five-State Corn Belt (Illinois, Indiana, Iowa, Missouri, and Ohio) is the largest corn production region, usually accounting for over half of total U.S. corn production.

Table A-1--Soil moisture recharge potential, post-drought years

Year	October-March Corn Belt precipitation
	Inches
1970/71	13.4
1974/75	17.1
1980/81	9.3
1983/84	18.9
1964/65-1986/87 average	15.1

Table A-2--Early season corn plantings, post-drought years

Year	Corn Belt plantings by mid-May
	Percent
1971	78
1975	74
1981	61
1984	33
1965-87 average	60

average level of plantings by mid-May in 1984 may have resulted from the relatively large amount of precipitation in the preceding October through March and may have contributed to corn yields falling short of trend estimates that year. However, the shortfall in the 1975 corn yield recovery cannot be attributed to late plantings despite the above average level of precipitation in the preceding October through March.

The Roles of Planting Dates and Growing Season Weather

The results from the analysis of the adjusted trend yield estimates suggest that a more complex relationship between planting dates, weather, and corn yields exists.

Both precipitation and temperature during the growing season are important for crop development. Figure A-2 shows typical daily water use rates for 110 growing day corn plants (5). The largest water use occurs from about the 40th day following planting to about the 80th day, with peak water use near the 60th day of growth during tasseling and silking. For a corn crop planted on typical dates in May, most of the water needs would occur in July. However, a significant portion of the water use could occur in June if much of the crop is planted by mid-May.

Temperatures also play an important role in crop development. Hot weather can stress the crop at critical stages of grain formation, as well as increase evaporation of moisture reserves from the soil, reducing water availability when it is most needed.

Early plantings typically would be expected to be beneficial for corn yields because June weather is usually more favorable for crop development. June tends to have more precipitation than July (table A-3). Additionally, the standard deviation of precipitation is smaller in June. Combined with the smaller water use of corn at early stages of crop development, this implies a smaller risk in June of shortfalls in meeting water needs. Average temperatures in June also tend to be cooler than in July, with standard deviations of temperature about equal in the 2 months. Thus, water evaporation and heat stress to the crop typically would be less in June.

Figure A-2
Typical Water Use Rate for Corn

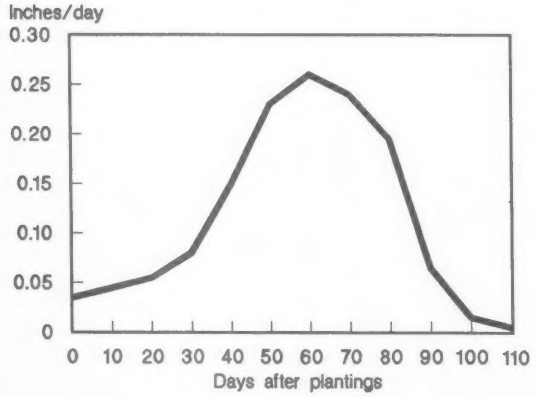


Table A-3--Corn Belt weather, 1965-87

Variable and month	Mean	Standard deviation
Precipitation	Inches	
June	4.2	0.8
July	3.9	1.1
Temperature	Degrees	
June	71.2	2.0
July	75.5	1.9

Econometric Model

To reflect the effects of growing season weather variables on yields, the adjusted trend model used earlier was augmented by adding Corn Belt precipitation and temperature variables for the months of June and July.[3] The timing of the daily water use rates suggests that weather is important throughout July, so July weather variables were used directly. However, the timing of water use in June depends on when the crop is planted. To reflect the effects of early planting, June weather variables were weighted by the portion of the Corn Belt crop planted by mid-May.

A quadratic form was used for the weather variables, initially with both linear and squared terms. Multicollinearity problems led to the removal of the linear temperature variables in the final model specification. The resulting equation is:

(2) YIELD = 110.1 + 2.17 TREND - 0.219 ACRES - 17.45 D83
(3.6) (10.4) (1.3) (2.7)

+ 15.70 MM JUNEP - 1.79 MM JUNEP2 - 0.0065 MM JUNET2
(1.5) (1.4) (1.6)

+ 13.05 JULYP - 0.98 JULYP2 - 0.0103 JULYT2
(1.8) (1.0) (2.7)

$R^2 = 0.96$ RMSE = 4.2 Estimation period = 1965-1987

where YIELD, TREND, ACRES, and D83 are as defined earlier and:

[3] Using monthly averages of weather variables may not capture all the effects of weather on yields because the timing of rainfalls and fluctuations in temperatures within the month are not represented.

MM = the portion of the Corn Belt corn crop planted by mid-May,

JUNEP = June precipitation in the Corn Belt (inches),

JULYP = July precipitation in the Corn Belt (inches),

JUNEP2 = the square of JUNEP,

JULYP2 = the square of JULYP,

JUNET2 = the square of June temperature in the Corn Belt (degrees F.), and

JULYT2 = the square of July temperature in the Corn Belt (degrees F.).

Again, numbers in parentheses below each estimated coefficient are t-statistics, R^2 is the coefficient of determination, and RMSE is the root mean square error.

The estimated coefficients of the non-weather variables in equation 2 have implications similar to the results of equation 1. The trend term implies an annual increase in corn yields due to productivity gains of about 2.2 bushels an acre. For each additional million acres planted with corn, average yields would be expected to fall by about 0.2 bushels an acre. The 1983 dummy variable coefficient implies that 1983 actual yields were about 17 bushels below what trend, acreage, planting dates, and weather would imply. The coefficient of determination means that 96 percent of the variation in corn yields is explained by equation 2. The root mean square error has been reduced to 4.2 bushels an acre in this equation.

Equation 2 also has smaller yield estimate errors than equation 1 for each of the 4 post-drought years discussed earlier. Yield estimate errors shown in table A-4 are labeled as "under" when the equation estimate is below the actual yield, and "over" when the equation estimate is above the actual yield.

When weather is included, yield estimates for 1971 and 1981 from equation 2 are higher than those from the adjusted trend equation, narrowing the gap in the yield under-predictions. This largely is due to beneficial effects of July weather in those years that was cooler and wetter than average. Equation 2 also reduces the over-predicted yield estimates for 1975 and 1984. July weather that was significantly drier than average in 1975 pushed the yield estimate from equation 2 below the actual yield. For 1984, hotter than average June weather and drier than average weather in both June and July lowered the yield estimate in equation 2 closer to the actual yield.

Table A-4--Yield estimate errors, post-drought years

Year	Equation 1	Equation 2
	Bu./acre	
1971	4.8 under	0.9 under
1975	4.6 over	4.2 under
1981	5.8 under	1.1 under
1984	4.9 over	4.1 over

"Under" means the equation estimate is below the actual yield; "over" means above actual.

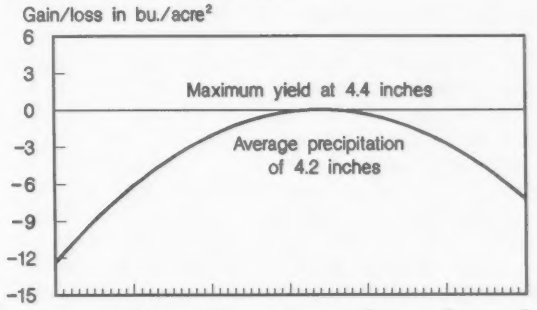
Effects of Weather Variables

Figures A-3 through A-6 show the effects of June and July weather variables implied by equation 2. Each figure shows the estimated gain or loss in yields resulting from departures from average in each weather variable. The effects of June weather variables (figures A-3 and A-4) are evaluated at the 1965-87 average level of corn crop plantings by mid-May of about 60 percent.

Corn Belt precipitation averages about 4.2 inches in June, near the optimal level for yields implied by equation 2 of 4.4 inches (figure A-3). While these precipitation levels are somewhat higher than the daily water use rates would imply the crop needs, the larger precipitation levels allow for additions of moisture to the soil and water loss to runoff and evaporation. Figure A-3 indicates that departures from the average in precipitation result in losses in yield potential. Within a range of one standard deviation of the average, yield losses corresponding to precipitation of 3.4 to 5.0 inches are less than 1 bushel per acre. However, yield potential drops more quickly for greater departures from average in June precipitation.

Although the quadratic form was used for the effects of June temperature, figure A-4 shows that the response of yields to changes in June temperature is nearly linear over the

Figure A-3
Corn Yield Response to June Corn Belt Precipitation[1]



1/ Assumes 60 percent of Corn Belt crop planted by mid-May.
2/ From average weather yields.

relevant range. Figure A-4 indicates that the response of corn yields to June temperatures is small. For temperature departures of one standard deviation from the June average of 71.2 degrees, yield gains and losses each equal about 1 bushel an acre corresponding to temperatures of 69.2 and 73.2 degrees.

Corn Belt precipitation in July averages 3.9 inches. The results of equation 2 imply the optimal level for yield potential is about 6.6 inches (figure A-5). Thus, when July precipitation exceeds the average level, there are significant potential gains for corn yields. Also, because most of the critical growing stages occur in July, indicated yield losses for precipitation levels below average are larger than in June. Potential yield losses also exceed potential yield gains. Within a range of one standard deviation below and above the average, yield losses corresponding to precipitation of 2.8 inches are about 7 bushels per acre, but yield gains corresponding to 5.0 inches of precipitation are about 5 bushels an acre. Further, although the estimated potential gain in yields is over 7 bushels an acre for the estimated optimal July precipitation of 2.7 inches above the average, a precipitation shortfall of 2.7 inches below average is estimated to cause asymmetric yield losses of over 21 bushels an acre.

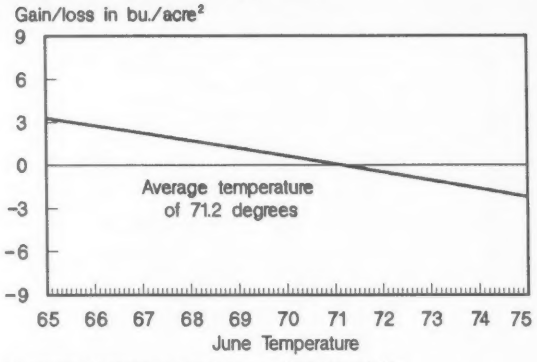
The July total of daily water use rates of about 7 inches differs slightly from the implied optimal level of precipitation in equation 2 of 6.6 inches and differs substantially from average July precipitation. This suggests that the corn crop obtains a significant amount of its water needs in July from moisture already in the soil.

As with June temperatures, figure A-6 shows that the response of corn yields to July temperatures is nearly linear over the relevant range. The response of corn yields to temperature in July is larger than in June. For temperature departures of one standard deviation from the July average of 75.5 degrees, yield gains and losses each are about 3 bushels an acre corresponding to temperatures of 73.6 to 77.4 degrees.

Effects of Planting Dates

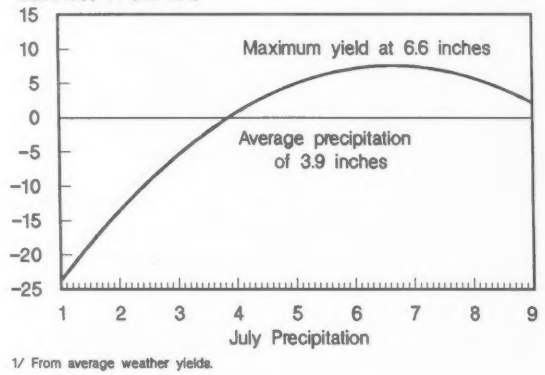
The effects on corn yields of June precipitation and temperature shown in figures A-3 and A-4 were derived from the interaction terms in equation 2 between the weather variables and the mid-May plantings variable, with 60 percent (the average proportion) of the crop assumed planted by mid-May. Figure A-7 illustrates the effects that the timing of plantings has for corn yields for different combinations of June weather. As expected from the earlier discussion of water use rates and average June and July weather, if June weather is average, yield potentials improve when a larger portion of the corn crop is planted by mid-May.

Figure A-4
Corn Yield Response to June Corn Belt Temperature[1]



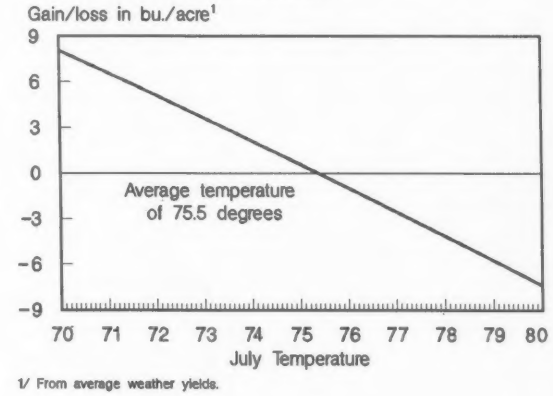
1/ Assumes 60 percent of Corn Belt crop planted by mid-May.
2/ From average weather yields.

Figure A-5
Corn Yield Response to July Corn Belt Precipitation



1/ From average weather yields.

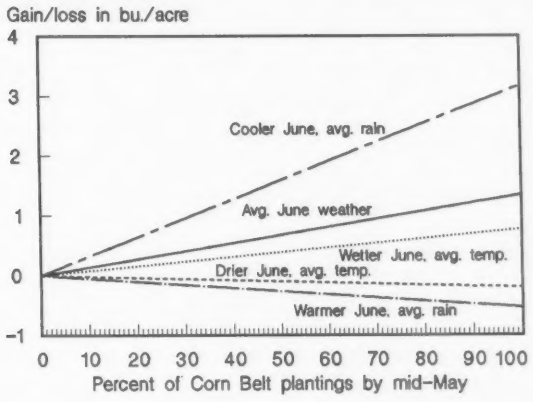
Figure A-6
Corn Yield Response to July Corn Belt Temperature



1/ From average weather yields.

Figure A-7

Corn Yield Response to Percent of Plantings by Mid-May



Somewhat different implications for the effects of planting dates result, however, if June weather varies from average. Figure A-7 also shows the effects of planting dates on yields for four alternatives to normal June weather. Each alternative weather scenario is derived by separately varying June precipitation and temperatures by one standard deviation above and below their averages, with other weather held at average levels.

June weather that is cooler than average is better for crop development, making early plantings beneficial. Consequently, larger yields result when a higher proportion of the crop is planted by mid-May. Warmer June weather is less favorable for crop development and reduces yields from those attained with average weather. At a level of one standard deviation above average, a warmer June lowers yields for additional portions of the crop planted by mid-May and makes early plantings marginally detrimental.

Both wetter and drier weather in June at one standard deviation from average are marginally inferior to average June weather for yields. Early plantings are still beneficial for yields if June weather is one standard deviation wetter than average. However, a drier June at one standard deviation from average makes early plantings marginally detrimental.

Much larger yield variations can result with early plantings if June weather differs by more than one standard deviation from average. For example, with 97 percent of the Corn Belt corn crop planted by mid-May last year, these relationships imply that the hot, dry weather in June 1988 (1.1 standard deviations warmer and 3.9 standard deviations drier) reduced corn yields by nearly 20 bushels an acre from yields estimated with average weather and only 60 percent of the crop planted by mid-May.

Implications for 1989

The regression equations presented in this article were used to forecast potential corn yields for 1989. Farmers have indicated that they intend to plant 73.3 million acres of corn this year. With this level of plantings, the adjusted trend yield estimate of equation 1 implies a national yield of 126 bushels an acre. Implicit in this trend yield estimate are assumptions that weather and the timing of plantings are average.

Using equation 2, estimates of 1989 corn yields can be made with alternative assumptions regarding weather and planting dates. About 70 percent of the Corn Belt corn crop was planted by mid-May this year, 10 percent ahead of the 1965-87 average. With this plantings date information, average weather for June and July would result in an estimated 1989 corn yield of nearly 125 bushels an acre.

If June and July weather are not average, somewhat different yields could result, however. Table A-5 shows estimated 1989 corn yields for different weather combinations derived from equation 2. Weather that is one standard deviation below average is defined as "low," while weather one standard deviation above average is defined as "high." For the range of weather shown, estimated 1989 average corn yields would be 112 to 134 bushels an acre. However, weather combinations required to attain yields toward the ends of that range are less likely to occur. Most weather combinations in table A-5 result in yield estimates above 120 bushels an acre, reflecting the ability of corn yields to rebound following droughts if subsequent growing season weather is favorable.

Table A-5 also illustrates that corn yields are more sensitive to weather in July than in June. July precipitation is most critical, typically followed by July temperatures. This relationship appears to hold even when plantings are ahead of average, although to a lesser extent. Yield impacts due to weather changes within one standard deviation of average give ranges of about 1 bushel an acre corresponding to June precipitation and about 2-1/2 bushels an acre corresponding to June temperatures. These impacts compare to yield ranges of 12 bushels an acre for July precipitation changes and 6 bushels an acre for July temperature changes within one standard deviation of average.

Finally, table A-5 reflects a result illustrated earlier that while there is some potential for higher yields if weather is better than average, the magnitude of reductions in yields due to less favorable weather is greater. For example, if July precipitation were to exceed average levels by one standard deviation and other weather were average, the corn yield estimate would be improved by nearly 5 bushels an acre, to over 129. A shortfall in July precipitation of one standard deviation with other weather normal, however, would push

Table A-5--1989 Corn yield estimates for different June and July weather assumptions

July weather assumption		Low June precipitation			Average June precipitation			High June precipitation		
Precipitation	Temperature	Low June temp.	Average June temp.	High June temp.	Low June temp.	Average June temp.	High June temp.	Low June temp.	Average June temp.	High June temp.
						Bu./acre				
Low	Low	120.4	119.2	117.8	121.5	120.2	118.9	121.1	119.8	118.5
Low	Average	117.5	116.2	114.9	118.6	117.3	116.0	118.2	116.9	115.6
Low	High	114.5	113.2	111.9	115.6	114.3	113.0	115.2	113.9	112.6
Average	Low	127.7	126.4	125.1	128.8	127.5	126.2	128.4	127.1	125.8
Average	Average	124.7	123.5	122.1	125.8	124.5	123.2	125.4	124.1	122.8
Average	High	121.7	120.5	119.1	122.8	121.5	120.2	122.4	121.1	119.8
High	Low	132.5	131.2	129.9	133.5	132.3	130.9	133.1	131.9	130.5
High	Average	129.5	128.2	126.9	130.6	129.3	128.0	130.2	128.9	127.6
High	High	126.5	125.3	123.9	127.6	126.3	125.0	127.2	125.9	124.6

Assumes planted acreage of 73.253 million acres and a mid-May plantings percent in the Corn Belt of 70 percent. "Low" means weather variable is below its average by one standard deviation; "high" means above average by one standard deviation.

estimated yields down more than 7 bushels an acres, to under 118.

Conclusions

The regression equations presented in this article have illustrated some important characteristics about how corn yields are affected by planting dates and weather. Results from the adjusted trend analysis indicate that there is little carryover effect from a drought to yields in the following year—yields tend to rebound to near trend levels following a drought. While soil moisture recharge is an important consideration, too much moisture in the spring can delay plantings. This would typically reduce yields by exposing more of the critical growing stages of the crop to less favorable weather in the summer.

This analysis indicates that the most important factor in determining corn yields in the year following a drought is weather during the growing season. A regression equation incorporating information about planting dates and variables of growing season weather implies that timely rains in July play the most critical role, with July temperatures next in importance in most years.

Planting dates are important for corn yields. On average, earlier plantings increase yields because June weather is typically more favorable for corn than July weather. However, earlier plantings can hurt corn yields if June weather is particularly hot and dry, as in 1988.

Other results show that average weather is not necessarily optimal for crop development and yields. While average precipitation in June is near the estimated optimal level, average precipitation in July falls short of the estimated optimal amount. This result suggests that the corn crop draws a significant amount of its water needs in July from moisture already in the soil. Finally, corn yields show more downward risks due to poor weather than upward yield potential due to good weather.

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Grain Transportation: A Forecast

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Abstract: A sharp upturn in demand for jumbo covered hopper cars and continued low water conditions on the Missouri and lower Mississippi rivers will create a tight transportation situation for grain marketing. Sufficient capacity, however, will be available to meet forecast export for feed grains and wheat. Replacement of Lock 26 at Alton, Illinois will close the Mississippi River for about 1 week in October-November 1989. The closing, combined with low water and a tight rail car supply, could limit a postharvest upturn in export shipments, but should not markedly disrupt grain distribution.

Keywords: Feed grains, transportation, rail, barge, drought.

Sufficient Transport Available

Although the Mississippi River's capacity remains constrained by low water conditions, overall rail and barge capacity should meet anticipated needs for the 1988/89 crop year. The number of jumbo covered hopper cars (100-ton capacity) has increased slightly from 1988, while shipments of grain by rail have been below 1988's record levels. Water levels for the lower Mississippi during the first 4 months of 1989 have been well below those of the same period of 1988, but averaged higher than in the drought months (June-December) of that year. The volume of grain shipped by barge has stayed below 1988 levels through March.

Rail Situation

Car Inventory Rises

The inventory of jumbo covered hopper cars rose slightly in 1989 as a few new cars were added to the fleet and others returned to service from repair shops. These cars have come to dominate rail grain shipments, where once the 40-foot narrow door boxcar prevailed. Fewer than 2,000 of the old narrow door cars remain in service, in contrast to more than 240,000 jumbo hopper cars.

Demand for Jumbos Doubled

Most free flowing, dry commodities (including dry fertilizer, plastic pellets, some ores, and grains) are railed in covered hopper cars. Total volume moved in these cars has more than doubled since 1986, when jumbo car loadings averaged nearly 27,800 cars per week. In the first quarter of 1989 such loadings averaged 57,000 cars per week, with grains accounting for 56 percent of the total. For the same months of 1988, grains averaged 55 percent of total. Railroads have not yet found it necessary to significantly expand their fleet in response to increased demand. Instead, they have doubled utilization of jumbo hopper cars from 6 loadings per car per year to more than 12 loadings each year. Since cars used for grain must be cleaned of nongrain materials before grain can be loaded, a given car tends to carry the same type of commodity for much of the year. For example, a car loaded with phosphates at the beginning of the season will generally continue to carry phosphates throughout the fertilizer shipping season. Phosphate cars become available for grain shipments before peak harvest time, and consequently cars are efficiently allocated among commodities.

Despite the doubling in total demand for use of these cars, rail rates for grain have risen only moderately since 1986. The Bureau of Labor Statistics' Freight Rate Index for March 1989 shows rates rising only 10 percent from the 1986 average. Since rates for all commodities rose 5 percent in the same period, one could conclude that the supply of jumbo hopper cars has remained adequate.

Figure B-1
Ownership of Jumbo Covered Hopper Cars

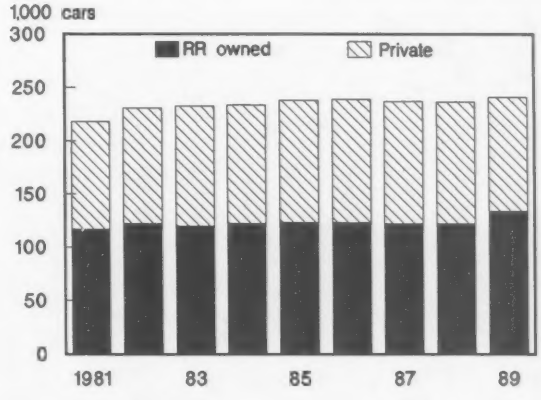
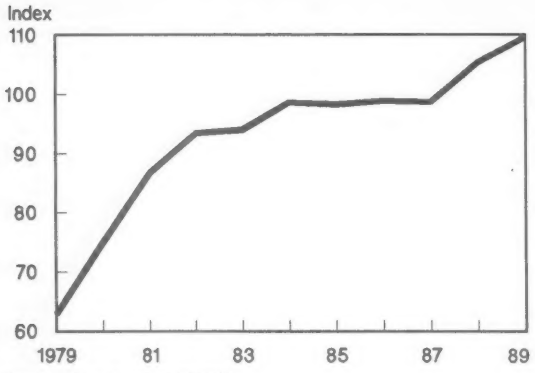


Figure B-2
Rail Rate Index for Grain

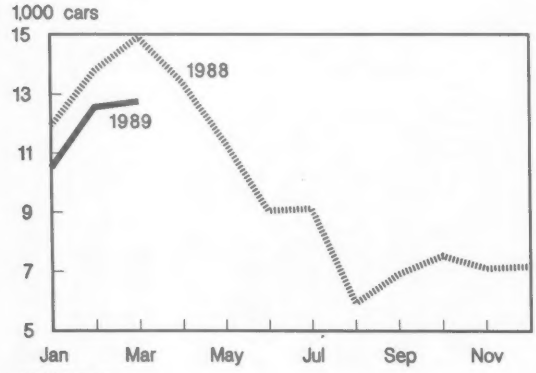


Annual average. December 1984=100.

Export Forecast Attainable

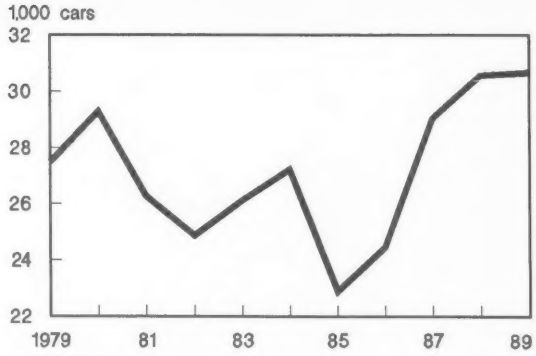
Shipments of grain by rail to North Atlantic, South Atlantic and Gulf, and Pacific ports during the first quarter of this year have averaged 11,900 cars per week, 12 percent below the same period of 1988. Meeting the current export estimates of corn and wheat would require deliveries of about 15,000 cars per week between mid-April and the end of the 1988/89 crop year. Because much of the corn exported will be shipped by barge through the U.S. Gulf ports, sufficient transportation capacity will be available to allow the current export estimate to be fulfilled. During the first quarter of 1989, rail shipments of all grains and oilseeds to both export and domestic points have averaged 30,600 cars per week. For the same months of 1988, an average of 33,100 cars were shipped.

Figure B-3
Rail Car Unloadings of Grain at Coastal Ports



Weekly average.

Figure B-4
Rail Car Loadings of Grain and Soybeans



Weekly average.
Source: Association of American Railroads.

At the same time, the contracts rates under which unit trains operate, may preclude some shippers from receiving all the rail cars they desire. Given the tight car supply that will likely arise, shippers who have not signed appropriate contracts could find their car orders unfilled. The Union Pacific Railroad (UP) offers advance car bookings beyond the more usual contract terms. At mid-May, all UP unit trains available for advanced bookings had been booked through September, the most distant month available for signup. As the crop year progresses, some sporadic car shortages may occur, but these should be short-lived and pose no real barriers to a successful marketing year.

Barge Situation

Navigation To Remain Impaired

The Mississippi River through April had not recovered from the drought induced low water conditions of last year. Navigation on the middle and lower segments of the river will probably remain impaired in 1989, as in 1988. However, sufficient capacity exists to carry the volume of grain implied by current marketing estimates.

Between 1944 and 1988 the flood gauge at St. Louis, Missouri averaged 19.5 feet in April, falling to 6-9 feet in September. Thus a substantial reduction in water depth can be expected to occur between spring and fall. In 1988 the water's level fell from 15.1 feet in April to 0.4 feet in September. These gauges do not indicate the channel's depth; instead they afford a measure of the quantity of water available. Channel depths can be and are effected by dredging and other activities. In April 1989 the flood gauges at St. Louis, Missouri averaged 13.5 feet, nearly 2 feet below the previous year and 6 feet below the 1944-88 average. In the coming months, flood gauges will likely reflect decreasing amounts of water, as they did last year. Much of this will result from continuing low flows from the Missouri River.

Figure B-5
River Stages at St. Louis

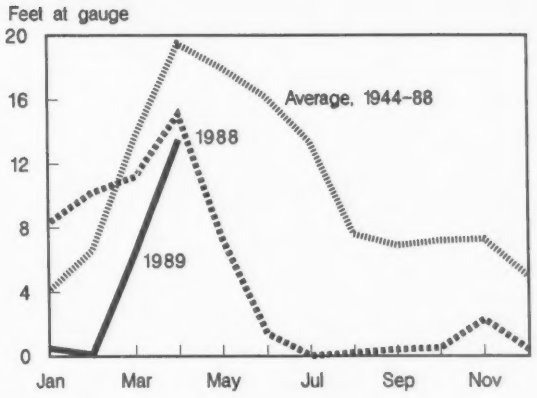


Figure B-6
Grain Shipments on the Mississippi River

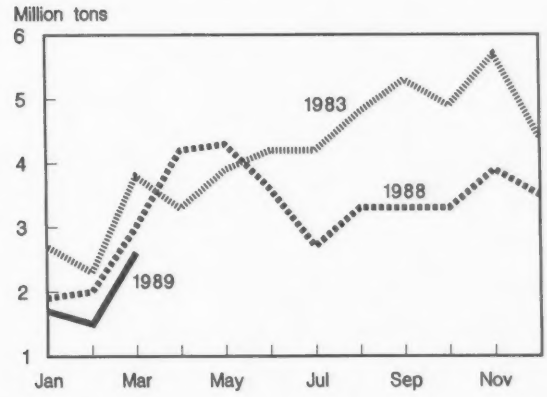
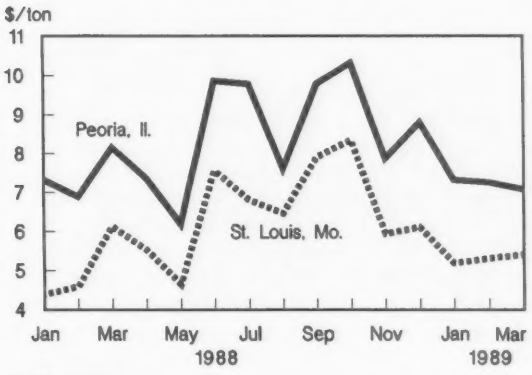


Figure B-7
Barge Rates to New Orleans



Monthly average.

In 1988, the Missouri supplied 65-70 percent of the flow at St. Louis; normally the Missouri would account for 45 percent of the flow. Although water releases in 1988 were below average, the Missouri's increased share of the flow stemmed from low flow on the Mississippi and its tributaries.

Currently Missouri River reservoirs are 50-60 percent full. The Missouri River Division, U.S. Army Corps of Engineers plans to release slightly more water than last year, but less than in a normal year. Also, the Missouri River Division plans a shortened navigation season because of the low reservoir storage levels. The river opened 1 week later and will close 25-30 days earlier than usual. The effect on total barge traffic will be slight, but the impact on Mississippi River water level will be significant. The Missouri River District plans to build reservoir levels by reducing flows below Sioux City, Iowa, at the end of the navigation season. Moreover, the Missouri River level below Sioux City, Iowa cannot be raised between mid-May and early September because the habitat of endangered bird species must be preserved.

In the first quarter of 1989, grain shipments by barge have lagged 1988 levels by about 16 percent. Rates on the Illinois River have averaged slightly below the same period of 1988, and rates from St. Louis to New Orleans have averaged only 5 percent above 1988. It appears that continued low water has had only a moderate impact on shipping costs, and rates on the Mississippi will remain slightly above 1988 levels for the rest of the crop year.

Mississippi To Close in the Fall

Further hindering navigation, the Mississippi River will be closed to navigation for 1 week this fall. Replacement of lock 26 at Alton, Illinois will require closing the river at this point for about 6 days. The precise dates of closure are not yet known, but it should occur around October-November. The closure will reduce annual capacity by about 2 percent and should not markedly disrupt grain distribution.

Most of the grain carried on the Mississippi River is bound for export. About 87 percent of the grain exported through Louisiana Gulf ports arrives by barge. In 1988 these ports accounted for 48 percent of total U.S grain exports.

A combination of low water and the river's closing for 1 week in November could limit a postharvest upturn in export shipments. In 1988 the river system carried 39 million tons of grain, 2 percent above 1987. The system appears to have operated at or near the capacity available in 1988 with reduced water flows. However, the reduced capacity would not allow the 1983 volume, 49.4 million tons, to have been achieved.

List of Tables

Table 1--Feed grains: Marketing year supply and disappearance, 1983/84-1989/90 1/

Year 2/	Supply				Domestic	
	Beginning stocks	Production	Imports	Total	Food, alcohol, and industrial	Seed
						Million m
1983/84	108.6	136.4	0.7	245.7	28.3	1.5
1984/85	39.6	236.9	0.8	277.3	30.6	1.5
1985/86	57.5	274.4	0.9	332.7	33.5	1.5
1986/87	126.3	252.3	0.7	379.4	34.1	1.4
1987/88	152.1	215.4	1.1	368.6	35.5	1.3
1988/89 4/	133.6	149.2	1.3	284.1	37.0	1.2
1989/90 4/	61.6	233.1	0.9	295.6	---39.5---	

	Area		
	Set-aside and diverted	Planted	Harvested for grain
	Million hectares		
1983/84	15.9	41.6	32.5
1984/85	2.1	49.5	43.2
1985/86	2.9	51.8	45.1
1986/87	7.3	48.5	41.3
1987/88	12.5	43.1	35.1
1988/89	11.1	41.1	32.5

1/ Aggregated data on corn, sorghum, barley, and oats. 2/ The marketing year fo barley, June 1. 3/ Includes total Government loans (original and reseal). 4/ Pro payments. 7/ Deficiency payments.

/90 1/

Disappearance					Ending stocks		
omestic use							
Seed	Feed and residual	Total	Exports	Total disappearance	Govt. owned	Privately owned 3/	Total
llion metric tons							
1.5	119.7	149.5	56.6	206.1	8.0	31.6	39.6
1.5	131.1	163.2	56.6	219.8	8.9	48.6	57.5
1.5	134.8	169.8	36.6	206.4	20.4	105.9	126.3
1.4	145.5	181.0	46.3	227.2	48.7	103.4	152.1
1.3	145.5	182.3	52.6	234.9	34.1	99.5	133.6
1.2	121.6	159.8	62.6	222.4	17.8	43.8	61.6
---	129.5	169.0	57.5	226.5			69.1

	Yield per harvested hectare	Index Average price received by farmers 5/	Government-support program Total payments to participants
	Metric tons	1977=100	$ million
	4.20	156	6/ 1,103
	5.48	130	7/ 1,860
	6.07	108	7/ 2,785
	6.13	78	6/ 7,343
	6.13	17	6/ 8,382
	4.59		2,651

year for corn and sorghum begins September 1; for oats and
4/ Projected. 5/ Excludes support payments. 6/ Deficiency and diversion

Table 2--Foreign coarse grains: Supply and disappearance, 1980/81-1989/90 1/

Year	Beginning stocks	Production	Feed	Total Disappearance	Imports	Adjusted imports 2/	Ending stocks
			Million metric tons				
Corn:							
1980/81	45.8	240.1	168.4	298.0	79.1	78.1	48.9
1981/82	48.9	235.1	175.9	291.3	77.6	67.3	43.8
1982/83	43.8	230.3	174.6	281.5	73.2	63.3	39.1
1983/84	39.1	241.4	167.7	288.9	64.9	61.1	39.8
1984/85	39.8	263.9	183.6	303.6	72.5	66.6	47.4
1985/86	47.4	254.3	186.0	291.7	62.0	54.5	41.2
1986/87	41.2	268.1	195.1	310.3	61.1	56.4	37.2
1987/88	37.2	268.0	196.0	311.1	62.7	56.8	37.9
1988/89 3/	37.9	268.2	213.6	326.7	75.1	66.9	32.6
1989/90 4/	32.6	276.9	213.9	327.2	73.0	65.9	31.7
Sorghum:							
1980/81	6.9	44.6	23.3	50.8	12.8	14.1	8.1
1981/82	8.1	48.1	28.5	55.5	14.3	13.7	7.4
1982/83	7.4	44.0	25.2	50.5	12.3	11.6	6.1
1983/84	6.1	46.5	25.8	52.4	13.1	13.0	6.5
1984/85	6.5	44.1	26.2	52.1	12.9	13.1	6.0
1985/86	6.0	41.9	25.0	47.4	9.6	8.7	5.0
1986/87	5.0	40.6	23.3	46.4	8.1	8.0	4.2
1987/88	4.2	37.2	22.4	44.3	8.6	8.2	3.0
1988/89 3/	3.0	41.9	24.9	48.1	11.0	10.5	4.5
1989/90 4/	4.5	42.4	24.4	48.7	9.3	9.5	4.5
Barley:							
1980/81	16.9	155.4	107.5	156.6	16.3	13.8	17.1
1981/82	17.1	144.9	105.4	149.6	20.4	13.9	14.4
1982/83	14.4	155.6	107.8	152.9	17.2	13.1	17.9
1983/84	17.9	153.6	115.4	160.4	20.3	16.4	12.9
1984/85	12.9	162.5	115.8	157.8	23.1	18.0	19.1
1985/86	19.1	165.1	120.3	161.8	22.3	18.4	22.6
1986/87	22.6	169.1	125.6	169.8	24.1	18.5	26.7
1987/88	26.7	169.0	126.0	173.0	19.7	16.0	25.1
1988/89 3/	25.1	159.5	119.9	161.6	20.3	17.6	24.4
1989/90 4/	24.4	165.0	126.3	168.5	20.7	17.4	22.3
Total coarse grains: 5/							
1980/81	77.4	534.0	342.0	600.3	110.3	108.1	81.5
1981/82	81.5	520.3	351.7	588.6	114.5	97.5	72.8
1982/83	72.8	533.6	357.2	585.8	104.0	89.5	73.2
1983/84	73.2	551.0	364.6	609.2	100.2	92.8	70.8
1984/85	70.8	578.1	377.4	618.9	111.2	99.6	85.9
1985/86	85.9	568.4	387.3	608.7	95.7	82.2	81.2
1986/87	81.2	582.4	396.8	627.9	95.1	83.5	81.3
1987/88	81.3	576.8	396.2	630.1	92.9	81.9	79.5
1988/89 3/	79.5	574.3	407.7	641.9	107.9	96.4	73.3
1989/90 4/	73.3	590.3	415.3	650.2	104.5	93.7	70.0

1/ Aggregated on basis of local marketing years, except for adjusted imports. 2/ Based on Oct./Sept. trade year and excludes intra-EC trade. 3/ Preliminary. 4/ Forecast. 5/ Includes oats, rye, millet, and mixed grains.

Source: Compiled from World Grain Situation and Outlook, Foreign Agricultural Service, and USDA data.

Table 3--Corn: Marketing year supply and disappearance, area, and price

Year beginning September 1	Supply				Food, alcohol, ar industrial
	Begin-ning stocks	Produc-tion	Imports	Total	
1983/84	3,523.1	4,174.7	2.7	7,700.5	956.0
1984/85	1,006.3	7,674.0	3.5	8,683.8	1,070.0
1985/86	1,648.2	8,876.7	10.6	10,535.5	1,140.0
1986/87	4,039.5	8,249.9	2.1	12,291.5	1,175.0
1987/88	4,881.7	7,072.1	4.0	11,957.8	1,212.0
1988/89 2/	4,259.1	4,921.2	5.0	9,185.3	1,237.8
1989/90 2/	1,830.0	7,850.0	3.0	9,683.0	---1,3

	Area			Yield per harvested acre	Re
	Set-aside and diverted	Planted	Harvested for grain		far
	Million acres			Bushels	
1983/84	32.2	60.2	51.5	81.1	
1984/85	4.0	80.5	71.9	106.7	
1985/86	5.4	83.4	75.2	118.0	
1986/87	13.6	76.7	69.2	119.3	
1987/88	23.0	65.7	59.2	119.4	
1988/89	20.5	67.6	58.2	84.6	7/

1/ Includes quantity under loan and farmer-owned reserve. 2/ Project
5/ Deficiency payments. 6/ Deficiency and diversion payments. 7/ Sept

d prices, 1983/84-1989/90

Disappearance						Ending stocks Aug. 30		
Domestic use				Exports	Total disappearance	Govt. owned	Privately owned 1/	Total
Food, hol, and dustrial	Seed	Feed and residual	Total					
Million bushels								
956.0	19.1	3,817.6	4,792.7	1,901.5	6,694.2	201.5	804.8	1,006.3
070.0	21.2	4,079.0	5,170.2	1,865.4	7,035.6	224.9	1,423.3	1,648.2
140.0	19.5	4,095.3	5,254.8	1,241.2	6,496.0	545.7	3,493.8	4,039.5
175.0	16.7	4,713.7	5,905.4	1,504.4	7,409.8	1,443.2	3,438.5	4,881.7
212.0	16.7	4,735.5	5,964.2	1,734.5	7,698.7	835.0	3,424.1	4,259.1
237.8	17.2	4,000.3	5,255.3	2,100.0	7,355.3			1,830.0
---1,300.0---		4,200.0	5,500.0	1,950.0	7,450.0			2,233.0

	Average prices				Government-support program		
d	Received by farmers 3/	St. Louis No. 2 yellow	Omaha No. 2 yellow	Gulf Ports No. 2 yellow	National average loan rate	Target price	Total payments to participants
s	$/bu.						$ million
	3.21	3.49	3.23	3.67	2.65	2.86	4/ 904
	2.63	2.81	2.65	3.00	2.55	3.03	5/ 1,654
	2.23	2.37	2.25	2.52	2.55	3.03	5/ 2,470
	1.50	1.68	1.53	1.83	1.92	3.03	6/ 6,355
	1.94	2.19	1.98	2.40	1.82	3.03	6/ 7,321
	7/ 2.57	7/ 2.79	7/ 2.55	2.98	1.77	2.93	

Projected. 3/ Excludes support payments. 4/ Diversion payments.
7/ September 1988-March 1988 average.

Table 4--Sorghum: Marketing year supply and disappearance, area, and prices,

Year beginning September 1	Supply				Do	
	Beginning stocks	Production	Imports	Total	Food, alcohol, and industrial	Se
						Mill
1983/84	439.1	487.5	0.1	926.7	7.7	2
1984/85	287.4	866.2	0.1	1,153.7	15.3	2
1985/86	300.2	1,120.3	---	1,420.5	26.0	1
1986/87	551.0	938.1	---	1,489.1	10.4	1
1987/88	743.3	739.2	---	1,482.5	23.5	1
1988/89 2/	662.7	577.6	---	1,240.3	---35.0---	
1989/90 2/	405.0	700.0	---	1,105.0	---35.0---	

	Area			Yield per harvested acre	
	Set-aside and diverted	Planted	Harvested for grain		Received by farmers 3/
	Million acres			Bushels	
1983/84	5.7	11.9	10.0	48.7	4.89
1984/85	0.6	17.3	15.4	56.4	4.15
1985/86	0.9	18.3	16.8	66.8	3.45
1986/87	2.7	15.3	13.9	67.7	2.45
1987/88	4.1	11.8	10.6	69.7	2.79
1988/89	3.9	10.4	9.1	63.8	7/ 4.11

--- = Not applicable.
1/ Includes quantity under loan and farmer-owned reserve. 2/ Projected. 3/
5/ Deficiency payments. 6/ Deficiency and diversion payments. 7/ September

prices, 1983/84-1989/90

Disappearance						Ending stocks Aug. 30		
Domestic use								
and al	Seed	Feed and residual	Total	Exports	Total disap-pearance	Govt. owned	Privately owned 1/	Total
Million bushels								
	2.3	384.7	394.7	244.6	639.3	102.8	184.6	287.4
	2.0	539.3	556.6	296.9	853.5	112.1	188.1	300.2
	1.9	663.6	691.5	178.0	869.5	207.2	343.8	551.0
	1.5	532.9	544.8	198.3	743.1	409.0	334.3	743.3
	1.3	565.7	590.5	231.3	821.8	463.6	199.1	662.7
-35.0---		500.3	535.3	300.0	835.3			405.0
-35.0---		525.0	560.0	250.0	810.0			295.0

Average prices				Government-support program		
eceived by rmers 3/	Kansas City No. 2 yellow	Texas No. 2 yellow	Gulf Ports No. 2 yellow	National average loan rate	Target price	Total payments to participants
$/cwt.						$ million
4.89	5.22	5.53	5.77	4.50	4.86	4/ 114
4.15	4.46	5.04	4.90	4.32	5.14	5/ 158
3.45	3.72	4.33	4.07	4.32	5.14	5/ 228
2.45	2.73	3.24	3.21	3.25	5.14	6/ 585
2.79	3.40	3.81	3.96	3.11	5.14	6/ 699
4.11	7/ 4.82	7/ 4.76	7/ 4.93	3.00	4.96	

cted. 3/ Excludes support payments. 4/ Diversion payments.
ptember 1988-March 1989 average.

Table 5--Barley: Marketing year supply and disappearance, area, and prices, 1983/84

Year beginning June 1	Supply				Domesti	
	Beginning stocks	Production	Imports	Total	Food, alcohol, and industrial	Seed
						Million b
1983/84	216.7	508.9	7.1	732.7	149.5	19.5
1984/85	189.4	599.2	10.1	798.7	149.0	21.6
1985/86	247.4	591.4	9.0	847.8	147.2	21.4
1986/87	324.8	610.5	8.7	944.0	156.1	21.2
1987/88	335.6	529.5	13.9	879.0	158.3	17.8
1988/89 2/	321.2	290.5	12.0	623.7	169.3	15.7
1989/90 2/	164.0	450.0	10.0	624.0	---185.0---	

	Area			Yield per harvested acre		
	Set-aside and diverted	Planted	Harvested for grain		Received by farmers 3/	N
	Million acres			Bushels		
1983/84	1.1	10.4	9.7	52.3	2.47	
1984/85	0.5	12.0	11.2	53.4	2.29	
1985/86	0.7	13.2	11.6	51.0	1.98	
1986/87	1.8	13.1	12.0	50.8	1.61	
1987/88	2.9	11.0	10.1	52.7	1.62	
1988/89	2.8	9.7	7.5	38.6	2.82	7/

1/ Includes quantity under loan and farmer-owned reserve. 2/ Projected. 3/ Exc
5/ Deficiency and diversion payments. 6/ Deficiency payments. 7/ June 1988-March

1983/84-1989/90

Disappearance					Ending stocks May 31		
Domestic use							
Seed	Feed and residual	Total	Exports	Total disappearance	Govt. owned	Privately owned 1/	Total
llion bushels							
19.5	282.8	451.8	91.5	543.3	11.9	177.5	189.4
21.6	303.9	474.5	76.8	551.3	14.6	232.8	247.4
21.4	332.6	501.2	21.8	523.0	57.4	267.4	324.8
21.2	294.4	471.7	136.7	608.4	75.5	260.9	335.6
17.8	256.4	432.5	125.3	557.8	50.1	271.1	321.2
15.7	199.7	384.7	75.0	459.7	30.0	134.0	164.0
	220.0	405.0	75.0	480.0	40.0	104.0	144.0

Average prices				Government-support program		
	Minneapolis		Portland			
ed 3/	No. 2 or better feed 4/	No. 3 or better malting	No. 2	National average loan rate	Target price	Total payments to participants
	$/bu.					$ million
	2.48	2.84	2.91	2.16	2.60	5/ 72
	2.09	2.55	2.59	2.08	2.60	6/ 50
	1.53	2.24	2.23	2.08	2.60	6/ 160
	1.44	1.89	1.96	1.56	2.60	5/ 356
	1.78	2.04	2.09	1.49	2.60	5/ 335
	7/ 2.28	7/ 4.11	7/ 2.73	1.44	2.51	

3/ Excludes support payments. 4/ Starting March 1987, shifted to Duluth.
8-March 1989 average.

Table 6--Oats: Marketing year supply and disappearance, area, and prices, 1983

Year beginning June 1	Supply				Dome	
	Beginning stocks	Production	Imports	Total	Food, alcohol, and industrial	See
						Mill
1983/84	219.8	477.0	30.1	726.9	40.9	31
1984/85	181.1	473.7	34.0	688.8	41.0	34
1985/86	179.9	520.8	27.5	728.2	44.0	38
1986/87	183.7	386.4	33.3	603.4	45.0	30
1987/88	132.7	374.0	46.3	553.0	49.8	36
1988/89 2/	112.0	218.8	60.0	390.8	70.3	29
1989/90 2/	89.0	420.0	40.0	549.0	---110.0---	

	Area			Yield per harvested acre	Received by farmers 3/
	Set-aside and diverted	Planted	Harvested for grain		
	Million acres			Bushels	
1983/84	0.3	20.3	9.1	52.6	1.62
1984/85	0.1	12.4	8.2	58.0	1.67
1985/86	0.1	13.3	8.2	63.7	1.23
1986/87	0.5	14.7	6.9	56.3	1.21
1987/88	0.8	18.0	6.9	54.0	1.56
1988/89	0.3	13.9	5.6	39.1	2.62

NA = Not available.
1/ Includes quantity under loan and farmer-owned reserve. 2/ Projected. 3/
5/ Deficiency payments. 6/ June 1988-March 1989 average.

es, 1983/84-1989/90

Disappearance					Ending stocks May 31		
Domestic use			Exports	Total disappearance	Govt. owned	Privately owned 1/	Total
Seed	Feed and residual	Total					
Million bushels							
31.9	470.9	543.7	2.1	545.8	1.5	179.6	181.1
34.6	432.0	507.6	1.3	508.9	1.4	178.5	179.9
38.4	459.9	542.3	2.2	544.5	1.9	181.8	183.7
30.5	394.8	467.9	2.8	470.7	3.5	129.2	132.7
36.1	360.8	439.7	1.3	441.0	3.5	108.4	112.0
29.7	200.8	300.8	1.0	301.8	2.0	87.0	89.0
	320.0	430.0	2.0	432.0			117.0

Average prices				Government-support program		
ceived by mers 3/	Minneapolis No. 2 white, heavy	Portland No. 2 white, heavy	Toledo No. 2	National average loan rate	Target price	Total payments to participants
$/bu.						$ million
1.62	1.87	1.95	2.01	1.36	1.60	4/ 13
1.67	1.81	2.12	1.92	1.31	1.60	NA
1.23	1.31	1.60	1.08	1.31	1.60	5/ 8
1.21	1.46	1.53	1.20	0.99	1.60	4/ 32
1.56	1.92		1.68	0.94	1.60	4/ 27
2.62	6/ 2.91		6/ 2.36	0.90	1.55	5/ 2

ed. 3/ Excludes support payments. 4/ Deficiency and diversion payments.

Table 7--Corn: Marketing year supply and disappearance, specified periods, 1983/84

Year beginning September 1	Supply				Domestic use	
	Beginning stocks	Production	Imports	Total	Food, alcohol, and industrial	Seed
						Million bushel
1983/84:						
Sept.-Nov.	3,523.1	4,174.7	0.5	7,698.3	238.6	---
Dec.-Feb.	5,651.7	---	0.6	5,652.3	222.8	---
Mar.-May	3,865.0	---	1.0	3,866.0	247.3	16.8
June-Aug.	2,145.1	---	0.6	2,145.7	247.3	2.3
Mkt. year	3,523.1	4,174.7	2.7	7,700.5	956	19.1
1984/85:						
Sept.-Nov.	1,006.3	7,674.0	0.9	8,681.2	249.7	---
Dec.-Feb.	6,631.1	---	0.4	6,631.5	241.5	---
Mar.-May	4,623.2	---	1.1	4,624.3	283.8	17.0
June-Aug.	2,835.5	---	1.1	2,836.6	295.0	4.2
Mkt. year	1,006.3	7,674.0	3.5	8,683.8	1,070.0	21.2
1985/86:						
Sept.-Nov.	1,648.2	8,876.7	1.0	10,525.9	278.0	---
Dec.-Feb.	8,614.7	---	1.3	8,616.0	264.0	---
Mar.-May	6,587.1	---	2.3	6,589.4	293.0	16.1
June-Aug.	4,990.0	---	6.0	4,996.0	305.0	3.4
Mkt. year	1,648.2	8,876.7	10.6	10,535.5	1,140.0	19.5
1986/87:						
Sept.-Nov.	4,039.5	8,249.9	0.8	12,290.2	280.0	---
Dec.-Feb.	10,305.1	---	0.3	10,305.4	270.0	---
Mar.-May	8,248.2	---	0.5	8,248.7	310.0	16.4
June-Aug.	6,332.2	---	0.5	6,332.7	315.0	0.3
Mkt. year	4,039.5	8,249.9	2.1	12,291.5	1,175.0	16.7
1987/88:						
Sept.-Nov.	4,881.7	7,072.1	0.6	11,954.4	292.0	---
Dec.-Feb.	9,771.0	---	0.9	9,771.9	282.0	---
Mar.-May	7,635.6	---	1.6	7,637.2	315.0	16.7
June-Aug.	5,835.5	---	0.9	5,836.4	323.0	0.5
Mkt. year 2/	4,881.7	7,072.1	4.0	11,957.8	1,212.0	17.2
1988/89:						
Sept.-Nov.	4,259.1	4,921.2	0.7	9,181.0	294.0	---
Dec.-Feb.	7,071.6	---	1.5	7,073.1	284.0	---
Mar.-May						
June-Aug.						
Mkt. year 2/	4,259.1	4,921.2	5.0	9,185.3	---1,255.0---	
1989/90:						
Mkt. year 3/	1,830.3	7,850.0	3.0	9,683.3	---1,300.0---	

--- = Not applicable.
1/ Includes quantity under loan and farmer-owned reserve. 2/ Preliminary. 3/

1983/84-1989/90

Disappearance				Ending stocks		
tic use						
Feed and residual	Total	Exports	Total disappearance	Govt. owned	Privately owned 1/	Total
n bushels						
1,311.0	1,549.6	497.0	2,046.6	227.0	4,424.7	5,651.7
1,056.0	1,278.8	508.5	1,787.3	214.0	2,651.0	3,865.0
939.5	1,203.6	517.3	1,720.9	195.0	1,950.1	2,145.1
511.1	760.7	378.7	1,139.4	201.5	804.8	1,006.3
3,817.6	4,792.7	1,901.5	6,694.2	201.5	804.8	1,006.3
1,294.2	1,543.9	506.2	2,050.1	206.7	6,424.4	6,631.1
1,182.9	1,424.4	583.9	2,008.3	209.7	4,413.5	4,623.2
1,009.1	1,309.9	478.9	1,788.8	221.7	2,613.8	2,835.5
592.8	892.0	296.4	1,188.4	224.9	1,423.3	1,648.2
4,079.0	5,170.2	1,865.4	7,035.6	224.9	1,423.3	1,648.2
1,215.5	1,493.5	417.7	1,911.2	388.6	8,226.1	8,614.7
1,299.6	1,563.6	465.3	2,028.9	509.4	6,077.7	6,587.1
1,085.9	1,395.0	204.4	1,599.4	550.9	4,439.1	4,990.0
494.3	802.7	153.8	956.5	545.7	3,493.8	4,039.5
4,095.3	5,254.8	1,241.2	6,496.0	545.7	3,493.8	4,039.5
1,384.0	1,664.0	321.1	1,985.1	968.2	9,337.3	10,305.1
1,471.8	1,741.8	315.4	2,057.2	1,362.2	6,886.0	8,248.2
1,089.9	1,416.3	500.2	1,916.5	1,491.5	4,840.7	6,332.2
768.0	1,083.3	367.7	1,451.0	1,443.2	3,438.5	4,881.7
4,713.7	5,905.4	1,504.4	7,409.8	1,443.2	3,438.5	4,881.7
1,493.4	1,785.4	398.0	2,183.4	1,683.4	8,087.6	9,771.0
1,446.0	1,728.0	408.3	2,136.3	1,767.7	5,867.9	7,635.6
956.2	1,287.9	513.8	1,801.7	1,304.9	4,530.6	5,835.5
839.4	1,162.9	414.4	1,577.3	835.0	3,424.1	4,259.1
4,735.0	5,964.2	1,734.5	7,698.7	835.0	3,424.1	4,259.1
1,333.5	1,627.5	481.9	2,109.4	611.0	6,459.9	7,071.6
1,076.2	1,360.2	508.3	1,868.5	465.0	4,739.6	5,204.6
4,000.0	5,255.0	2,100.0	7,355.0	350.0	1,480.3	1,830.3
4,200.0	5,500.0	1,950.0	7,450.0			2,233.3

y. 3/ Projected.

Table 8--Sorghum: Marketing year supply and disappearance, specified periods, 198

Year beginning September 1	Supply				Dome	
	Beginning stocks	Production	Imports	Total	Food, alcohol, and industrial	Seed
					Million bu	
1982/83:						
Sept.-May	318.6	835.1	0.0	1,153.7	6.0	0.9
June-Aug.	529.1	0.0	0.0	529.1	1.9	0.9
Mkt. year	318.6	835.1	0.0	1,153.7	7.9	1.8
1983/84:						
Sept.-May	439.1	487.5	0.0	926.6	5.7	1.1
June-Aug.	368.9	0.0	0.1	369.0	2.0	1.2
Mkt. year	439.1	487.5	0.1	926.7	7.7	2.3
1984/85:						
Sept.-May	287.4	866.2	0.1	1,153.7	12.4	1.5
June-Aug.	360.8	0.0	0.0	360.8	2.9	0.5
Mkt. year	287.4	866.2	0.1	1,153.7	15.3	2.0
1985/86:						
Sept.-May	300.2	1,120.3	0.0	1,420.5	22.1	1.2
June-Aug.	630.0	0.0	0.0	630.0	3.9	0.5
Mkt. year	300.2	1,120.3	0.0	1,420.5	26.0	1.7
1986/87:						
Sept.-May	551.0	938.1	0.0	1,489.1	8.2	1.0
June-Aug.	835.0	0.0	0.0	835.0	2.2	0.5
Mkt. year	551.0	938.1	0.0	1,489.1	10.4	1.5
1987/88:						
Sept.-May	743.3	739.2	0.0	1,482.5	14.2	0.8
June-Aug.	807.8	0.0	0.0	807.8	9.3	0.5
Mkt. year 2/	743.3	739.2	0.0	1,482.5	23.5	1.3
1988/89:						
Sept.-May						
June-Aug.						
Mkt. year 3/	662.7	577.6	0.0	1,240.3	---35.0---	
1989/90:						
Mkt. year 3/	405.0	700.0	0.0	1,105.0	---35.0---	

1/ Includes quantity under loan and farmer-owned reserve. 2/ Preliminary. 3/

ds, 1982/83-1989/90

Disappearance					Ending stocks		
--Domestic use--							
Seed	Feed and residual	Total	Exports	Total disap-pearance	Govt. owned	Privately owned 1/	Total
lion bushels							
0.9	453.5	460.4	164.2	642.6	54.0	475.1	529.1
0.9	41.3	44.1	45.9	90.0	171.5	267.6	439.1
1.8	494.8	504.5	210.1	714.6	171.5	267.6	439.1
1.1	356.5	363.3	194.4	557.7	78.0	290.9	368.9
1.2	28.2	31.4	50.2	81.6	102.8	184.6	287.4
2.3	384.7	394.7	244.6	639.3	102.8	184.6	287.4
1.5	542.2	556.1	236.8	792.9	111.1	249.7	360.8
0.5	(2.9)	0.5	60.1	60.6	112.1	188.1	300.2
2.0	539.3	556.6	296.9	853.5	112.1	188.1	300.2
1.2	626.9	650.2	140.3	790.5	181.4	447.5	630.0
0.5	36.9	41.3	37.7	79.0	207.2	343.8	551.0
1.7	663.8	691.5	178.0	869.5	207.2	343.8	551.0
1.0	490.1	499.3	154.8	654.1	400.4	434.6	835.0
0.5	45.5	48.2	43.5	91.7	409.0	334.3	743.3
1.5	535.6	547.5	198.3	745.8	409.0	334.3	743.3
0.8	474.4	489.4	185.3	674.7	535.0	272.8	807.8
0.5	89.3	99.1	46.0	145.1	463.6	199.1	662.7
1.3	563.7	588.5	231.3	819.8	463.6	199.1	662.7
---	500.3	535.3	300.0	835.3	375.0	55.0	405.0
---	525.0	560.0	250.0	810.0			295.0

y. 3/ Projected.

Table 9--Average prices received by farmers, United States, by month, and loan rate, 1982-1988 1/

Year	Sept	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Average 2/	Loan rate
							$/bu.							
Corn:														
1982	2.15	1.98	2.13	2.26	2.36	2.56	2.71	2.95	3.03	3.04	3.13	3.35	2.55	2.55
1983	3.32	3.15	3.17	3.15	3.15	3.11	3.21	3.32	3.34	3.36	3.30	3.12	3.21	2.65
1984	2.90	2.65	2.55	2.56	2.64	2.62	2.67	2.70	2.68	2.64	2.60	2.44	2.63	2.55
1985	2.29	2.11	2.21	2.29	2.33	2.32	2.29	2.30	2.39	2.32	2.00	1.73	2.23	2.55
1986	1.45	1.40	1.47	1.50	1.48	1.42	1.47	1.52	1.66	1.69	1.60	1.47	1.49	1.92
1987	1.49	1.55	1.61	1.72	1.77	1.83	1.86	1.88	1.94	2.41	2.72	2.65	1.75	1.82
1988	2.60	2.58	2.51	2.53	2.60	2.58	2.59 3/	2.54						
							$/cwt.							
Sorghum:														
1982	3.80	3.70	3.78	3.97	4.09	4.42	4.67	4.92	5.05	5.05	5.03	5.29	4.41	4.32
1983	5.26	5.01	4.98	4.93	4.92	4.74	4.85	5.00	5.08	4.94	4.64	4.58	4.89	4.50
1984	4.24	4.05	4.05	4.15	4.16	4.10	4.24	4.46	4.54	4.52	4.04	3.74	4.15	4.32
1985	3.27	3.30	3.47	3.76	3.69	3.55	3.67	3.80	3.99	3.43	3.06	2.66	3.45	4.32
1986	2.36	2.34	2.38	2.41	2.37	2.36	2.45	2.58	2.69	2.79	2.66	2.52	2.45	3.25
1987	2.43	2.48	2.69	2.72	2.75	2.88	2.92	2.94	2.90	4.13	4.56	4.41	2.79	3.11
1988	4.24	4.17	3.98	3.99	4.09	4.05	4.03 3/	4.06						

Year	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Average 2/	Loan rate
							$/bu.							
Oats:														
1982	1.88	1.57	1.39	1.35	1.32	1.40	1.44	1.46	1.48	1.49	1.54	1.54	1.49	1.31
1983	1.51	1.46	1.45	1.55	1.62	1.67	1.73	1.81	1.88	1.81	1.82	1.84	1.62	1.36
1984	1.80	1.68	1.62	1.60	1.69	1.64	1.72	1.74	1.69	1.68	1.68	1.60	1.67	1.31
1985	1.59	1.31	1.16	1.10	1.08	1.17	1.20	1.18	1.16	1.14	1.13	1.21	1.23	1.31
1986	1.10	0.90	0.86	0.99	1.11	1.32	1.44	1.46	1.47	1.45	1.50	1.57	1.21	0.99
1987	1.52	1.29	1.40	1.49	1.60	1.62	1.76	1.79	1.84	1.78	1.82	1.84	1.56	0.94
1988	2.68	2.86	2.58	2.56	2.56	2.42	2.46	2.52	2.46	2.40 3/	2.13			
All barley:														
1982	2.39	2.16	2.20	2.17	1.98	2.06	2.19	2.16	2.00	2.09	2.22	2.36	2.18	2.08
1983	2.32	2.20	2.34	2.46	2.53	2.55	2.55	2.55	2.47	2.50	2.54	2.78	2.47	2.16
1984	2.61	2.54	2.26	2.25	2.29	2.25	2.19	2.24	2.21	2.18	2.16	2.22	2.29	2.08
1985	2.14	2.08	1.98	1.88	1.96	2.05	2.07	2.05	1.95	1.88	1.85	1.73	1.98	2.08
1986	1.57	1.67	1.51	1.45	1.58	1.69	1.62	1.60	1.63	1.69	1.69	1.76	1.59	1.56
1987	1.74	1.84	2.00	1.87	1.73	1.88	1.83	1.78	1.72	1.65	1.74	1.79	1.81	1.49
1988	2.46	2.97	2.79	2.88	2.86	2.95	2.74	2.68	2.66	2.74 3/	2.74			

Year	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
						$/bu.						
Feed barley:												
1982	2.52	2.23	1.98	1.91	1.87	1.94	1.98	2.07	1.99	2.08	2.26	2.43
1983	2.52	2.31	2.23	2.41	2.45	2.51	2.52	2.58	2.47	2.54	2.55	2.86
1984	2.72	2.60	2.10	2.13	2.19	2.19	2.20	2.22	2.27	2.19	2.16	2.30
1985	2.26	2.05	1.75	1.74	1.85	1.90	2.03	2.00	1.90	1.83	1.85	1.81
1986	1.61	1.44	1.21	1.33	1.49	1.62	1.59	1.56	1.61	1.69	1.71	1.84
1987	1.79	1.67	1.54	1.57	1.66	1.68	1.63	1.65	1.64	1.59	1.73	1.76
1988	2.07	2.34	2.33	2.39	2.34	2.30	2.27	2.29	2.34	2.35	3/ 2.32	
Malting barley:												
1982	2.26	2.10	2.38	2.58	2.22	2.26	2.39	2.32	2.00	2.09	2.13	2.18
1983	2.05	2.06	2.50	2.69	2.72	2.61	2.61	2.50	2.47	2.46	2.54	2.53
1984	2.52	2.48	2.50	2.52	2.52	2.39	2.18	2.29	2.11	2.17	2.17	2.10
1985	2.02	2.13	2.49	2.33	2.24	2.32	2.19	2.13	1.99	1.93	1.85	1.66
1986	1.52	2.07	2.23	1.85	1.83	1.78	1.65	1.70	1.69	1.69	1.65	1.66
1987	1.68	2.04	2.55	2.39	1.88	2.07	2.01	2.15	1.80	1.69	1.76	1.81
1988	2.80	3.27	3.37	3.44	3.41	3.34	3.27	3.24	3.22	3.22	3/ 3.35	

1/ Prices do not include an allowance for loans outstanding and Government purchases. 2/ U.S. season average prices based on monthly prices weighted by monthly marketings. 3/ Preliminary.

Source: Agricultural Prices, Agricultural Statistics Board, USDA.

Table 10--Cash prices at principal markets, 1982-1989

Year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Average
						$/bu.							
Corn, no. 2 yellow, Central Illinois:													
1982	2.14	1.94	2.24	2.28	2.35	2.62	2.82	3.08	3.09	3.14	3.26	3.58	2.71
1983	3.46	3.36	3.37	3.27	3.21	3.15	3.37	3.45	3.44	3.44	3.28	3.16	3.33
1984	2.92	2.66	2.61	2.56	2.64	2.64	2.68	2.72	2.69	2.64	2.59	2.46	2.65
1985	2.28	2.10	2.32	2.36	2.36	2.33	2.29	2.31	2.42	2.41	1.93	1.52	2.22
1986	1.34	1.34	1.55	1.52	1.44	1.38	1.46	1.56	1.75	1.74	1.60	1.46	1.51
1987	1.52	1.65	1.74	1.78	1.85	1.89	1.92	1.92	1.97	2.59	2.90	2.73	2.04
1988	2.70	2.71	2.56	2.60	2.65	2.60	2.65	2.57					
Corn, no. 2 yellow, Gulf Ports:													
1982	2.55	2.33	2.62	2.68	2.74	2.98	3.18	3.39	3.40	3.43	3.57	3.88	3.06
1983	3.75	3.76	3.74	3.64	3.60	3.48	3.74	3.76	3.71	3.73	3.62	3.52	3.67
1984	3.31	3.08	2.98	2.90	3.03	3.04	3.05	3.05	2.96	2.95	2.92	2.67	3.00
1985	2.59	2.50	2.69	2.75	2.72	2.63	2.56	2.57	2.68	2.63	2.12	1.85	2.52
1986	1.68	1.66	1.83	1.81	1.73	1.70	1.83	1.89	2.06	2.06	1.95	1.81	1.83
1987	1.86	2.00	2.08	2.11	2.32	2.23	2.30	2.28	2.29	3.05	3.22	3.02	2.40
1988	3.08	3.07	2.89	2.99	3.01	2.99	2.97	2.93					
Corn, no. 2 yellow, St. Louis:													
1982	2.32	2.12	2.43	2.49	2.52	2.79	2.99	3.24	3.24	3.27	3.39	3.68	2.87
1983	3.60	3.50	3.53	3.45	3.41	3.31	3.55	3.61	3.58	3.57	3.43	3.33	3.49
1984	3.09	2.84	2.77	2.75	2.86	2.84	2.86	2.88	2.81	2.79	2.72	2.47	2.81
1985	2.38	2.27	2.50	2.59	2.55	2.50	2.42	2.46	2.56	2.52	2.01	1.67	2.37
1986	1.47	1.46	1.68	1.69	1.61	1.57	1.65	1.74	1.93	1.92	1.79	1.65	1.68
1987	1.65	1.78	1.91	1.97	2.05	2.07	2.09	2.10	2.13	2.77	2.96	2.81	2.19
1988	2.82	2.82	2.70	2.76	2.81	2.79	2.82	2.76					
Corn, no. 2 yellow, Omaha:													
1982	2.23	2.12	2.35	2.37	2.42	2.62	2.82	3.09	3.10	3.11	3.18	3.39	2.73
1983	3.32	3.23	3.24	3.17	3.11	3.03	3.25	3.33	3.35	3.37	3.22	3.11	3.23
1984	2.94	2.71	2.61	2.55	2.60	2.61	2.68	2.73	2.68	2.70	2.61	2.39	2.65
1985	2.35	2.26	2.28	2.36	2.33	2.31	2.31	2.34	2.43	2.42	2.01	1.61	2.25
1986	1.41	1.40	1.55	1.54	1.44	1.39	1.47	1.57	1.76	1.77	1.59	1.47	1.53
1987	1.51	1.57	1.68	1.75	1.79	1.84	1.86	1.87	1.96	2.64	2.72	2.55	1.98
1988	2.57	2.61	2.47	2.54	2.57	2.54	2.58	2.38					
						$/cwt							
Sorghum, no. 2 yellow, Kansas City:													
1982	4.06	3.85	4.25	4.37	4.37	4.54	5.08	5.30	5.37	5.37	5.32	5.69	4.80
1983	5.55	5.37	5.25	5.16	5.09	5.03	5.40	5.36	5.39	5.40	4.95	4.74	5.22
1984	4.46	4.25	4.28	4.32	4.48	4.33	4.58	4.76	4.74	4.74	4.50	4.06	4.46
1985	3.56	3.62	3.75	3.97	3.95	3.80	3.82	4.00	4.25	4.00	3.20	2.71	3.72
1986	2.47	2.60	2.70	2.62	2.50	2.57	2.80	2.85	3.10	3.20	2.80	2.55	2.73
1987	2.64	2.75	2.90	2.95	3.05	3.24	3.27	3.16	3.21	4.58	4.79	4.28	3.40
1988	4.27	4.17	4.00	4.23	4.24	4.26	4.32	4.17					
Sorghum, no. 2 yellow, Texas High Plains:													
1982	4.39	4.08	4.38	4.65	4.82	5.19	5.52	5.94	5.76	5.81	5.86	5.85	5.19
1983	5.77	5.56	5.49	5.43	5.35	5.14	5.33	5.68	5.67	5.77	5.72	5.46	5.53
1984	5.22	4.95	4.86	4.90	4.84	4.86	4.98	5.14	5.22	5.25	5.24	NQ	5.04
1985	4.19	4.38	4.30	4.49	4.47	4.36	4.33	4.48	4.77	4.84	3.93	3.36	4.32
1986	3.35	3.24	2.97	3.06	2.94	2.89	3.06	3.32	3.56	3.60	3.58	3.30	3.24
1987	3.19	3.27	3.27	3.39	3.40	3.53	3.56	3.54	3.55	4.84	5.25	4.96	3.81
1988	4.98	4.95	4.62	4.63	4.75	4.69	4.72	4.63					

See footnotes at end of table.

Continued--

Table 10--Cash prices at principal markets, 1982-1989--Continued

Year	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Average
						$/bu.							
Barley, no. 3 or better malting, 65% or better plump, Minneapolis:													
1982	2.93	2.63	2.48	2.37	2.42	2.45	2.37	2.38	2.42	2.45	2.68	2.76	2.53
1983	2.60	2.54	2.76	2.90	2.96	2.95	2.77	2.85	2.76	2.91	3.04	3.06	2.84
1984	3.04	2.86	2.48	2.44	2.43	2.43	2.36	2.46	2.47	2.51	2.52	2.55	2.55
1985	2.46	2.25	2.03	2.15	2.10	2.27	2.29	2.28	2.20	2.34	2.40	2.07	2.24
1986	1.84	1.75	1.61	1.76	1.93	2.02	1.88	1.81	1.92	2.01	2.05	2.12	1.89
1987	2.07	1.93	1.73	1.98	2.08	2.05	2.01	2.02	2.15	2.08	2.11	2.24	2.04
1988	3.61	3.87	4.25	4.40	4.39	4.14	3.82	4.14	4.19	4.33	4.29		
Barley, no. 2 feed, Minneapolis 1/, 2/:													
1982	2.12	1.85	1.72	1.69	1.54	1.58	1.59	1.63	1.72	1.73	2.01	1.95	1.76
1983	1.96	1.95	2.42	2.61	2.60	2.53	2.39	2.55	2.56	2.65	2.74	2.77	2.48
1984	2.59	2.18	2.13	2.05	2.10	2.06	1.88	1.98	1.99	1.97	2.05	2.05	2.09
1985	1.90	1.66	1.46	1.40	1.41	1.49	1.60	1.57	NA	NA	NA	1.31	1.53
1986	1.23	1.16	1.13	1.27	1.50	1.63	1.23	NA	NA	1.64	1.76	1.86	1.44
1987	1.73	1.59	1.60	1.76	1.78	1.82	1.74	1.72	1.77	1.88	1.94	1.98	1.78
1988	2.41	2.31	2.08	2.24	2.32	2.27	2.14	2.24	2.33	2.49	2.52		
Oats, no. 2 heavy white, Minneapolis:													
1982	2.12	1.87	1.53	1.51	1.51	1.67	1.67	1.67	1.63	1.63	1.73	1.71	1.69
1983	1.67	1.60	1.79	1.94	2.00	1.97	1.94	1.98	1.82	1.88	1.89	1.96	1.87
1984	1.92	1.84	1.77	1.79	1.84	1.92	1.87	1.81	1.82	1.79	1.73	1.65	1.81
1985	1.59	1.44	1.23	1.24	1.19	1.32	1.39	1.37	1.30	1.27	1.16	1.22	1.31
1986	1.18	1.05	1.12	1.29	1.39	1.72	1.66	1.64	1.56	1.46	1.59	1.83	1.46
1987	1.64	1.61	1.77	1.85	1.97	2.05	2.02	2.10	2.06	1.93	1.94	2.12	1.92
1988	3.26	3.25	3.09	3.07	2.99	2.71	2.74	2.87	2.59	2.49	2.30		

NA = Not available.
NQ = No quotes.
1/ Prior to June 1977 reported as barley, no. 3 or better. 2/ Reporting point changed from Minneapolis #2 feed to Duluth #2 feed beginning March 1987.

Source: Grain and Feed Market News, Agricultural Marketing Service, USDA.

Table 11--Feed-price ratios for livestock, poultry, and milk, by months, 1982-1989

Year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Average
Hog/corn, U.S. basis 1/:													
1982	28.5	28.2	24.6	23.7	23.4	21.9	18.6	15.9	15.1	14.4	13.9	13.9	20.2
1983	13.3	12.8	11.8	14.0	15.4	14.6	14.3	14.3	14.1	14.6	15.8	16.2	14.3
1984	16.0	16.5	18.4	19.0	18.2	18.4	16.3	15.3	15.4	16.9	17.6	17.4	17.1
1985	17.3	20.4	19.5	19.8	19.0	18.4	17.6	17.3	19.2	22.7	29.5	35.9	21.4
1986	40.2	37.9	35.9	33.7	32.1	33.9	32.2	33.4	31.9	34.7	37.3	39.9	35.3
1987	36.4	31.3	25.1	23.4	24.3	25.0	22.7	22.3	23.7	19.5	16.2	17.1	23.9
1988	15.7	15.0	14.4	15.7	16.2	15.7	15.2 2/	14.3					
Beef-steer/corn, Omaha 3/:													
1982	27.5	27.7	25.1	25.2	24.5	23.4	22.7	21.9	21.8	21.2	19.6	18.1	23.2
1983	17.8	18.4	18.3	19.8	21.6	22.1	21.1	20.4	19.7	19.1	20.4	20.7	20.0
1984	21.3	22.4	24.6	25.6	24.8	24.1	22.2	21.5	21.5	21.0	20.4	21.7	22.6
1985	21.8	25.7	27.8	26.7	25.6	24.4	24.0	22.9	23.0	22.3	28.9	36.7	25.8
1986	42.1	42.7	39.7	38.8	40.8	43.9	41.9	42.2	40.2	38.9	41.4	43.9	41.4
1987	42.1	41.4	38.4	36.7	36.4	37.4	38.2	39.4	38.6	29.5	24.4	26.1	35.7
1988	26.4	26.4	28.4	27.9	28.1	28.7	29.4	30.2					
Milk/feed, U.S. basis 4/:													
1982	1.57	1.61	1.62	1.60	1.59	1.56	1.55	1.49	1.45	1.43	1.45	1.41	1.53
1983	1.36	1.39	1.36	1.34	1.33	1.33	1.34	1.32	1.32	1.32	1.35	1.40	1.35
1984	1.48	1.56	1.62	1.59	1.57	1.57	1.55	1.51	1.47	1.45	1.44	1.47	1.52
1985	1.51	1.56	1.55	1.53	1.52	1.50	1.48	1.48	1.46	1.45	1.51	1.55	1.51
1986	1.61	1.75	1.77	1.77	1.74	1.69	1.63	1.62	1.58	1.55	1.56	1.60	1.66
1987	1.65	1.65	1.65	1.63	1.52	1.48	1.43	1.40	1.37	1.36	1.15	1.17	1.45
1988	1.25	1.32	1.36	1.37	1.37	1.34	1.30 2/	1.29					
Egg/feed, U.S. basis 5/:													
1982	6.0	6.3	6.3	6.0	5.7	5.8	6.1	5.8	6.0	5.8	5.7	6.1	6.0
1983	6.0	6.2	6.9	7.7	8.8	8.5	7.4	8.6	6.5	5.8	5.8	5.8	7.0
1984	5.9	5.7	6.5	6.3	5.4	5.6	6.3	5.7	5.5	5.9	5.8	6.5	5.9
1985	7.1	7.3	7.5	7.4	7.2	6.9	7.6	6.4	6.4	5.7	6.9	7.3	7.0
1986	7.3	7.0	8.0	7.9	7.2	7.1	6.6	6.7	6.7	6.1	5.8	5.7	6.8
1987	6.7	6.1	6.6	5.8	5.6	5.3	5.8	5.2	4.9	5.2	4.9	4.9	5.5
1988	5.4	5.3	5.4	5.4	5.9	5.8	7.5 2/	6.2					
Broiler/feed, U.S. basis 6/:													
1982	2.6	2.5	2.5	2.5	2.6	2.7	2.4	2.3	2.4	2.6	2.8	2.8	2.6
1983	2.7	2.5	2.8	2.9	3.1	3.1	3.1	2.7	2.7	2.7	3.0	2.7	2.8
1984	2.8	2.6	2.8	2.7	2.9	2.9	2.8	2.8	3.1	3.2	3.1	3.1	2.9
1985	3.2	3.1	3.5	3.2	3.2	3.1	3.1	3.1	3.4	3.7	4.5	4.6	3.4
1986	3.8	4.4	3.9	3.5	3.6	3.5	3.3	3.2	3.3	3.0	2.9	3.3	3.5
1987	2.9	2.6	2.7	2.5	2.8	2.6	2.8	3.1	3.7	4.1	3.4	3.4	3.1
1988	3.2	2.9	2.7	2.8	2.9	3.1	3.2 2/	3.2					
Turkey/feed, U.S. basis 7/:													
1982	3.8	3.9	3.9	3.0	2.9	2.9	2.9	2.7	2.9	3.0	2.8	2.8	3.1
1983	3.0	3.0	3.1	3.5	3.6	3.2	3.3	3.3	3.3	3.3	3.6	3.8	3.3
1984	3.9	4.4	5.0	5.5	4.7	3.8	3.7	3.7	3.7	3.8	4.2	4.5	4.2
1985	5.0	5.5	5.5	5.5	3.4	3.4	3.5	3.8	3.5	4.3	4.5	4.6	4.4
1986	4.7	4.9	4.8	4.0	3.3	3.4	3.6	3.5	3.3	3.3	3.1	2.9	3.7
1987	2.8	2.8	3.1	3.6	2.8	2.6	2.5	2.7	2.8	3.0	2.9	3.1	2.9
1988	3.4	3.6	3.6	2.8	2.7	2.9	3.1 2/	3.3					

1/ Bushels of corn equal in value to 100 pounds of hog, live weight. 2/ Preliminary. 3/ Based on price of choice beef-steers, 900-1100 pounds. 4/ Pounds of 16-percent mixed dairy feed equal in value to 1 pound whole milk. 5/ Pounds of laying feed equal in value to 1 dozen eggs. 6/ Pounds of broiler grower feed equal in value to 1 pound broiler, live weight. 7/ Pounds of turkey grower feed equal in value to 1 pound of turkey, live weight.

Sources: Agricultural Prices, Agricultural Statistics Board, USDA.
Livestock, Meat & Wool Market News, Agricultural Marketing Service, USDA.

Table 12--Price trends, selected feeds, and corn products

Item	Unit	Sept.-Aug. 1987/88 1/	1988 Sept.	1988 Oct.	1988 Nov.	1988 Dec.	1989 Jan.	1989 Feb.	1989 Mar.	1989 Apr.
Wholesale, mostly bulk 2/:										
Soybean meal, 44% solvent, Decatur	$/ton	214.59	264.90	259.75	248.2	246.00	249.30	234.10	237.10	220.75
Soybean meal, high protein, Decatur	"	231.95	284.00	280.10	268.90	266.90	270.10	252.10	254.00	238.00
Cottonseed meal, 41% solvent, Memphis	"	173.20	205.00	212.50	203.00	199.40	200.50	191.25	196.25	184.40
Linseed meal, 34% solvent, Minneapolis	"	153.58	196.25	191.25	177.20	172.50	164.00	151.25	150.00	155.00
Meat and bone meal, Kansas City	"	250.36	278.75	280.60	271.10	258.80	275.40	261.10	266.00	254.40
Fishmeal, 67% protein, East Coast	"	453.78	530.00	523.10	505.00	471.90	463.50	436.60	427.50	413.10
Corn gluten feed, Illinois pts.	"	115.68	119.40	119.40	123.10	125.00	127.10	120.90	118.90	120.40
Corn gluten feed, 60% protein, Illinois pts.	"	303.11	309.40	313.75	293.00	277.50	281.00	288.10	280.60	275.60
Brewers' dried grains, Milwaukee	"	106.55	139.40	135.60	144.00	150.00	146.00	141.25	126.25	121.90
Distillers' dried grains, Lawrenceburg, Indiana	"	131.63	142.00	144.00	147.60	138.00	138.00	138.00	140.00	145.50
Feather meal, Arkansas pts.	"	242.98	277.80	280.60	251.00	286.90	298.00	282.50	285.00	260.00
Wheat bran, Kansas City	"	73.47	96.25	97.75	93.10	93.80	93.90	107.40	102.10	83.25
Wheat middlings, Kansas City	"	73.47	96.25	97.75	93.10	93.80	93.90	107.40	102.10	83.25
Rice bran, f.o.b. mills, Arkansas	"	57.89	62.40	69.90	67.50	77.50	74.70	57.10	73.75	62.25
Hominy feed, Illinois pts.	"	81.58	101.25	98.00	89.90	94.40	97.60	90.60	93.90	96.75
Alfalfa meal, dehydrated, Kansas City	"	107.67	130.50	133.50	136.40	138.80	139.00	138.00	141.00	145.50
Cane molasses, New Orleans	"	57.77	70.00	71.50	67.50	66.90	66.90	66.25	57.50	56.25
Molasses beet pulp, Los Angeles	"	100.83	127.50	129.25	129.00	129.00	127.00	128.50	133.00	124.50
Animal fat, Kansas City	c/lb.	11.79	12.00	12.00	11.40	12.10	12.50	12.00	12.00	12.00
Urea, 42% nitrogen, Forth Worth	$/ton	225.00	225.00	225.00	225.00	225.00	225.00	225.00	225.00	225.00
Corn, no. 2 white, Kansas City	$/bu.	2.55	3.93	3.93	3.93	3.93	3.90	3.88	3.88	3.88
Prices paid, U.S. basis 3/ 4/:										
Soybean meal, 44%	$/cwt	19.32	---	17.00	---	---	16.60	---	---	15.60
Cottonseed meal, 41%	"	18.64	---	15.50	---	---	15.70	---	---	15.70
Wheat bran	"	12.31	---	10.60	---	---	10.80	---	---	11.00
Wheat middlings	"	11.03	---	9.60	---	---	9.73	---	---	9.68
Broiler grower feed	$/ton	268.08	---	255.00	---	---	246.00	---	---	240.00
Laying feed	"	248.39	---	222.00	---	---	215.00	---	---	211.00
Turkey grower feed	"	303.84	---	266.00	---	---	260.00	---	---	254.00
Chick starter	"	275.3	---	258.00	---	---	244.00	---	---	242.00
Dairy feed, 16%	"	225.42	---	197.00	---	---	196.00	---	---	192.00
Beef cattle concentrate, 32-36% protein 5/	$/cwt	316.97	---	266.00	---	---	273.00	---	---	271.00
Hog concentrate, 38-42% protein 5/	"	426.23	---	371.00	---	---	362.00	---	---	344.00
Stock salt 5/	"	4.29	---	3.31	---	---	3.34	---	---	3.38
Corn products, wholesale 6/:										
Corn meal, yellow, New York	$/cwt	11.88	13.27	13.33	13.10	13.20	13.13	13.00	13.28	13.11
Grits (brewers'), Chicago	"	8.84	10.11	10.18	9.99	10.19	10.03	9.87	10.04	9.89
Syrup, Midwest/West	c/lb.	8.42	10.87	10.87	10.87	10.87	10.87	10.41	10.15	10.46
Sugar (dextrose), Midwest	"	22.43	24.50	24.50	24.50	24.50	24.50	24.50	24.60	25.00
High-fructose (dried weight in tank cars), Midwest	"	11.42	14.70	12.14	11.76	11.50	11.50	11.50	12.27	13.90
Corn starch, f.o b. Midwest	$/cwt	10.71	10.02	10.05	10.05	10.00	10.00	10.25	10.25	10.00

--- = Not applicable.
1/ Preliminary. 2/ Grain and Feed Market News, Agricultural Marketing Service, USDA, except urea which is from Feedstuffs, Miller Publishing Co., Minneapolis, Minnesota. 3/ Agricultural Prices, Agricultural Statistics Board, USDA. 4/ Prices paid data is available on a quarterly basis only. 5/ Prices previously published in cwt. 6/ Milling and Baking News, Kansas City, Missouri, except starch which is from industry sources.

Table 13--Corn, sorghum, barley, and oats exports, 1986/87 to date 1/

Year and month	Corn		Sorghum	Year and month	Barley		Oats	
	Grain only	Total			Grain only	Total	Grain only	Total
	Bushels				Bushels			
1986/87:				1986/87:				
Sept.	80,082,655	81,263,962	14,227,263	June	2,000	276,815	79,108	128,492
Oct.	124,025,138	124,843,757	18,547,828	July	1,164,620	1,597,139	81,504	217,421
Nov.	114,104,314	114,952,811	14,680,456	Aug.	12,319,164	12,514,711	73,364	335,437
1st Qtr.	318,212,107	321,060,530	47,455,547	1st Qtr.	13,485,784	14,388,665	233,976	681,350
Dec.	109,759,488	110,685,062	19,954,747	Sept.	12,772,707	12,912,177	121,288	327,625
Jan.	104,283,400	105,274,114	15,484,239	Oct.	16,480,986	16,559,353	167,403	411,976
Feb.	98,787,906	99,445,787	20,749,712	Nov.	14,292,746	14,363,851	32,293	167,870
2nd Qtr.	312,830,794	315,404,963	56,188,698	2nd Qtr.	43,546,439	43,835,381	320,984	907,471
Mar.	143,717,211	145,375,500	24,415,530	Dec.	14,532,134	14,661,828	17,314	315,049
Apr.	183,288,269	184,280,573	12,956,519	Jan.	1,205,709	1,262,335	30,960	75,145
May	169,091,351	170,576,405	13,788,332	Feb.	16,084,544	16,522,282	30,776	178,452
3rd Qtr.	496,096,831	500,232,478	51,160,381	3rd Qtr.	31,822,387	32,446,445	79,050	568,646
June	120,026,244	120,818,241	12,940,287	Mar.	17,639,725	18,150,611	115,234	277,846
July	133,984,531	134,900,706	22,883,734	Apr.	16,599,968	17,153,570	105,251	191,418
Aug.	111,320,100	112,008,863	7,698,710	May	10,522,937	10,726,481	67,436	168,607
4th Qtr.	365,330,875	367,727,810	43,522,731	4th Qtr.	44,762,630	46,030,662	287,921	637,871
Total	1,492,470,607	1,504,425,781	198,327,357	Total	133,617,240	136,701,153	921,931	2,795,338
1987/88:				1987/88:				
Sept.	135,403,937	136,130,948	17,832,858	June	517,681	754,738	104,217	187,886
Oct.	137,693,604	138,785,098	16,734,001	July	7,421,463	7,675,576	50,113	92,430
Nov.	122,468,369	123,086,306	10,296,951	Aug.	8,813,825	9,257,652	18,135	153,171
1st Qtr.	395,565,910	398,002,352	44,863,810	1st Qtr.	16,752,969	17,687,966	172,465	433,487
Dec.	148,189,862	149,286,585	21,462,657	Sept.	10,014,514	10,217,330	24,184	62,343
Jan.	133,442,601	134,301,735	19,428,923	Oct.	16,474,137	17,009,495	62,220	144,789
Feb.	123,706,547	124,687,685	22,498,453	Nov.	17,914,754	18,114,982	38,617	99,130
2nd Qtr.	405,339,010	408,276,004	63,390,033	2nd Qtr.	44,403,405	45,341,807	125,021	306,262
Mar.	164,120,347	165,290,216	24,662,618	Dec.	15,583,102	16,123,445	5,680	36,703
Apr.	166,544,265	167,301,461	30,340,887	Jan.	9,595,582	9,832,999	96,376	147,370
May	180,228,794	181,240,672	22,103,010	Feb.	6,764,525	7,239,965	29,937	148,578
3rd Qtr.	510,893,406	513,832,349	77,106,515	3rd Qtr.	31,943,209	33,196,409	131,993	332,651
June	132,984,257	133,834,129	13,740,797	Mar.	15,349,596	15,756,272	24,173	49,618
July	125,143,728	126,481,200	20,243,604	Apr.	8,796,666	9,029,851	12,420	114,674
Aug.	153,230,968	154,112,459	11,996,893	May	4,470,071	4,979,881	22,950	215,233
4th Qtr.	411,358,953	414,427,788	45,981,294	4th Qtr.	28,616,333	29,766,004	59,543	379,525
Total	1,723,157,278	1,734,538,492	231,341,652	Total	121,715,916	125,992,186	489,022	1,451,925
1988/89:				1988/89:				
Sept.	154,515,167	155,407,609	27,007,863	June	12,108,210	12,402,962	102,245	258,289
Oct.	174,032,976	175,250,327	19,499,969	July	11,513,586	11,757,762	38,739	88,239
Nov.	149,832,944	151,230,592	18,305,771	Aug.	2,214,904	2,500,232	24,394	145,962
1st Qtr.	478,381,088	481,888,528	64,813,603	1st Qtr.	25,836,700	26,660,955	165,378	492,490
Dec.	172,593,812	173,646,874	27,308,107	Sept.	8,758,198	8,833,519	21,017	90,049
Jan.	175,221,513	176,487,573	32,501,841	Oct.	1,513,507	2,242,594	30,378	57,096
Feb.	154,909,994	158,177,973	33,002,703	Nov.	2,625,600	3,228,822	73,371	126,759
2nd Qtr.	502,725,319	508,312,420	92,812,651	2nd Qtr.	12,897,305	14,304,935	124,766	273,904
Mar.	202,840,169	206,563,860	30,648,140	Dec.	15,121,435	15,440,102	29,605	51,848
Apr.				Jan.	84,517	417,785	115,957	154,015
May				Feb.	81,490	439,958	65,245	112,585
3rd Qtr.	202,840,169	206,563,860	30,648,140	3rd Qtr.	15,287,442	16,297,846	210,807	318,448
June				Mar.	1,964,297	2,424,381	22,487	70,294
July				Apr.				
Aug.				May				
4th Qtr.				4th Qtr.	1,964,297	2,424,381	22,487	70,294
Total	1,183,946,576	1,196,764,808	188,274,394	Total	55,985,744	59,688,117	523,438	1,155,135

1/ Total corn exports include grain only (white, yellow, seed, relief), dry process (cornmeal for relief, as grain, grits), and wet process (corn starch, sugar dextrose, glucose, high fructose). Sorghum includes seed and unmilled. Barley includes grain only (grain for malting purposes, other) and barley malt. Oats include grain and oatmeal (bulk and packaged).

Source: Bureau of the Census, U.S. Department of Commerce.

Table 14--Corn, sorghum, barley, and oats imports, 1986/87 to date 1/

Year and month	Corn		Sorghum	Year and month	Barley		Oats	
	Grain only	Total			Grain only	Total	Grain only	Total
	Bushels				Bushels			
1986/87:				1986/87:				
Sept.	311,213	332,783	6,329	June	1,296,495	1,501,548	5,325,371	5,345,316
Oct.	66,792	107,949	0	July	15,140	223,046	1,841,943	1,868,602
Nov.	333,201	353,750	33	Aug.	19,469	210,558	1,537,423	1,559,704
1st Qtr.	711,206	794,482	6,362	1st Qtr.	1,331,104	1,935,152	8,704,737	8,773,622
Dec.	66,353	131,009	0	Sept.	75,927	307,474	846,095	879,869
Jan.	85,979	134,935	0	Oct.	31,578	207,980	1,262,426	1,292,827
Feb.	14,207	52,622	86	Nov.	926,059	1,193,914	2,695,161	3,342,153
2nd Qtr.	166,539	318,566	86	2nd Qtr.	1,033,564	1,709,368	4,803,682	5,514,849
Mar.	29,812	63,602	0	Dec.	173,536	310,750	1,241,736	1,261,139
Apr.	400,056	428,391	0	Jan.	392,962	681,307	3,981,067	4,020,146
May	19,009	30,652	0	Feb.	625,953	772,737	3,994,932	4,027,553
3rd Qtr.	448,877	522,645	0	3rd Qtr.	1,192,451	1,764,794	9,217,735	9,308,838
June	326,401	339,131	0	Mar.	1,808,103	1,888,079	2,277,619	2,300,061
July	32,223	48,591	197	Apr.	508,133	591,606	3,401,071	3,434,844
Aug.	71,486	471,582	0	May	792,379	849,842	3,951,545	3,988,454
4th Qtr.	430,110	471,582	197	4th Qtr.	3,108,615	3,329,527	9,630,235	9,723,359
Total	1,756,732	2,107,275	6,645	Total	6,665,734	8,738,841	32,356,389	33,320,668
1987/88:				1987/88:				
Sept.	130,361	151,725	0	June	683,655	895,759	3,730,421	3,760,272
Oct.	354,333	373,790	24	July	195,998	448,601	1,717,932	1,735,424
Nov.	77,145	101,481	15	Aug.	220,222	434,668	1,541,932	1,582,741
1st Qtr.	561,839	626,997	39	1st Qtr.	1,099,875	1,779,029	6,990,285	7,078,437
Dec.	246,126	298,521	0	Sept.	1,061,243	1,396,496	1,712,779	1,744,204
Jan.	126,012	167,032	0	Oct.	926,329	1,222,581	1,270,484	1,372,822
Feb.	332,569	388,773	19	Nov.	876,498	1,209,707	5,106,952	5,148,944
2nd Qtr.	704,707	854,325	19	2nd Qtr.	2,864,070	3,828,784	8,090,215	8,265,970
Mar.	593,592	683,203	12	Dec.	1,146,248	1,384,778	2,537,116	2,566,987
Apr.	662,637	739,543	50	Jan.	1,846,528	2,038,574	4,086,315	4,154,507
May	113,606	140,762	0	Feb.	1,318,218	1,605,421	9,167,026	9,213,156
3rd Qtr.	1,369,835	1,563,509	62	3rd Qtr.	4,310,994	5,028,773	15,790,457	15,934,651
June	347,181	376,601	0	Mar.	1,163,560	1,280,709	6,426,933	6,482,646
July	257,479	275,042	0	Apr.	986,537	1,063,805	3,701,098	3,737,802
Aug.	169,701	207,314	7,229	May	876,452	961,089	4,721,106	4,756,988
4th Qtr.	774,361	858,958	7,229	4th Qtr.	3,026,549	3,305,603	14,849,137	14,977,436
Total	3,410,742	3,903,789	7,350	Total	11,301,488	13,942,189	45,720,094	46,256,494
1988/89:				1988/89:				
Sept.	148,437	177,913	0	June	1,596,106	1,700,185	5,680,015	5,772,502
Oct.	296,701	308,058	3,673	July	930,207	1,029,127	2,276,583	2,365,501
Nov.	180,789	233,514	0	Aug.	317,223	417,363	4,298,356	4,485,006
1st Qtr.	625,927	719,485	3,673	1st Qtr.	2,843,536	3,146,676	12,254,954	12,623,008
Dec.	106,151	173,241	0	Sept.	240,729	365,319	2,059,442	2,367,645
Jan.	307,023	723,699	0	Oct.	402,245	555,196	3,995,388	4,239,340
Feb.	178,260	591,385	15,130	Nov.	1,523,621	1,651,752	5,834,991	6,184,617
2nd Qtr.	591,434	1,488,325	15,130	2nd Qtr.	2,166,595	2,572,267	11,889,821	12,791,602
Mar.	420,381	742,935	0	Dec.	490,420	578,085	4,696,591	5,153,441
Apr.				Jan.	729,443	838,489	6,100,483	6,906,243
May				Feb.	1,627,551	1,720,819	9,313,487	10,172,629
3rd Qtr.	420,381	742,935	0	3rd Qtr.	2,847,414	3,137,394	20,110,561	22,232,313
June				Mar.	762,924	851,359	7,169,256	8,042,377
July				Apr.				
Aug.				May				
4th Qtr.				4th Qtr.	762,924	851,359	7,169,256	8,042,377
Total	1,637,742	2,950,745	18,803	Total	8,620,469	9,707,696	51,424,592	55,689,300

1/ Corn includes grain only (yellow dent corn, other), seed, and cornmeal. Sorghum is grain only. Barley includes grain only barley for malting, other), pearl barley, milled and malting. Oats include grain (hulled or unhulled), unhull oats fit and unfit for human consumption, and oatmeal fit for human consumption.

Source: Bureau of the Census, U.S. Department of Commerce.

Table 15--Hay (all): Acreage, supply, and disappearance, 1983/84-1989/90

Item	Unit	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90
Acreage harvested	Mil. acres	59.7	61.4	60.4	62.4	60.7	65.6	63.1
Yield per acre	Tons	2.36	2.45	2.46	2.49	2.46	1.93	2.44
Carryover (May 1)	Mil. tons	28.1	20.1	26.9	26.7	32.4	27.4	17.6
Production	"	140.8	150.6	148.6	155.5	149.3	126.8	154.1
Supply	"	168.9	170.7	175.5	182.2	181.7	154.2	171.7
Disappearance	"	148.8	143.8	148.8	149.8	154.4	136.5	NA
Roughage-consuming animal units (RCAU's)	Mil. units	87.1	83.6	81.2	79.0	77.3	77.7	NA
Supply per RCAU	Tons	1.94	2.04	2.16	2.31	2.35	1.98	NA
Disappearance per RCAU	"	1.71	1.72	1.83	1.90	2.00	1.76	NA

NA = Not available.

Table 16--Hay: Average prices received by farmers, United States by months, 1983/84-1988/89 1/

Year	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Average 2/
						$/ton							
Alfalfa:													
1983/84	83.80	78.30	77.40	77.40	79.10	82.40	80.10	81.70	82.00	85.10	84.40	84.30	81.33
1984/85	87.10	80.10	75.60	72.80	73.90	76.70	74.30	77.50	76.20	76.40	75.80	76.70	76.93
1985/86	85.50	74.90	72.50	68.10	70.70	70.50	67.70	69.10	70.20	71.30	72.00	69.80	71.86
1986/87	69.50	64.10	61.40	60.10	58.80	59.90	57.90	60.70	58.80	61.10	62.80	67.90	61.92
1987/88	77.70	67.40	65.70	64.60	69.30	68.00	64.60	68.80	66.50	69.60	72.50	76.90	69.31
1988/89	85.50	82.70	88.10	86.70	89.40	92.00	92.80	96.40	98.30	101.00	106.00	3/ 110.00	
Other hay:													
1983/84	58.90	56.10	54.30	52.90	57.80	59.50	62.10	64.30	63.30	63.80	64.90	66.50	60.37
1984/85	64.90	63.40	61.80	60.90	62.40	62.00	62.60	64.80	64.70	61.70	58.40	62.40	62.50
1985/86	58.70	54.00	57.00	58.40	58.60	58.20	55.30	56.00	56.10	56.00	54.80	54.90	56.50
1986/87	54.00	50.90	50.00	51.00	52.70	50.00	49.70	49.40	48.10	50.90	48.30	48.20	50.27
1987/88	51.00	49.60	50.00	52.20	52.40	53.00	53.60	53.30	52.20	51.50	51.70	51.90	52.09
1988/89	57.50	61.60	66.60	68.70	70.60	69.80	72.30	72.50	74.00	74.40	75.70	3/ 77.50	
All hay:													
1983/84	78.10	72.70	71.20	71.20	74.70	76.80	75.10	76.70	76.60	78.70	79.40	79.80	75.80
1984/85	82.50	76.10	72.40	70.40	70.70	73.10	71.40	73.40	73.00	73.10	72.20	72.50	72.70
1985/86	80.80	70.20	67.90	65.20	67.10	67.50	64.30	65.40	65.80	66.70	67.10	66.20	67.60
1986/87	66.70	61.00	58.80	58.20	57.60	57.90	56.00	57.70	56.10	58.50	59.20	64.10	59.32
1987/88	71.70	62.90	61.20	62.70	64.10	64.20	61.10	63.20	62.80	64.60	67.20	71.40	65.10
1988/89	81.10	77.40	82.30	82.10	85.10	86.80	87.60	89.60	91.20	93.70	98.10	3/ 104.00	87.10

1/ Prices reported for mid-month. 2/ U.S. season average prices weighted by monthly marketings. 3/ Preliminary.

Source: Agricultural Prices, Agricultural Statistics Board, USDA.

Table 17--Processed feeds: Quantity fed, 1986/87 to date 1/

	----Crop years---- 1986/87	1987/88	Mar.	Apr.	May
High protein:					
Oilseed meal--					
Soybean 2/	18,495	19,301	2,390	2,172	2,163
Cottonseed	1,026	1,442	146	110	106
Peanut	95	100	9	10	13
Sunflower	269	381	52	25	34
Total	19,885	21,224	2,596	2,316	2,315
Animal proteins--					
Tankage and meat meal	2,395	2,471	206	186	205
Fishmeal and solubles	518	481	NA	NA	NA
Total	2,913	2,952	206	186	205
Grain protein feeds--					
Gluten feed and meal	1,165	1,321	29	123	158
Brewers' dried grains	146	120	12	10	10
Distillers' dried grains	805	1,046	82	82	87
Total	2,116	2,487	123	215	256
Other:					
Wheat millfeeds	5,649	5,659	444	424	476
Alfalfa meal	589	554	46	41	38
Fats and oils	832	892	75	72	74
Total	7,070	7,105	565	537	588
Grand total 3/	31,984	33,768	3,489	3,254	3,364

NA = Not available.
1/ Adjusted for stocks, productions, foreign trade, and nonfeed uses where
to U.S. territories. 3/ Excludes fishmeal and solubles.

	1988							1989	
June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
1,000 metric tons								
1,896	1,785	1,855	1,822	1,460	1,780	1,577	1,563	1,425
128	97	110	111	101	153	159	150	147
12	11	7	4	5	10	11	11	14
33	30	(2)	14	31	38	31	28	22
2,070	1,923	1,970	1,952	1,598	1,982	1,778	1,752	1,609
195	199	223	214	209	214	200	191	182
NA	NA	NA	NA	NA	NA	NA	NA	NA
195	199	223	214	209	214	200	191	182
208	216	271	87	128	(54)	87	119	92
10	9	10	9	9	8	8	8	9
102	76	91	100	98	106	32	3	67
320	302	372	196	234	60	127	130	168
468	461	525	497	516	524	517	490	442
41	45	42	45	50	57	52	51	41
76	75	77	79	81	78	74	78	74
585	580	644	621	647	659	643	619	557
3,170	3,004	3,209	2,983	2,688	2,915	2,748	2,692	2,515

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